FACTORY

MANAGEMENT AND MAINTENANCE

A McGRAW-HILL PUBLICATION

JANUARY 1946

1. THE WORKER ISN'T SURE THAT EMPLOYEES SHOULD WORK AS HARD AS THEY CAN . . .

Question: When a man takes a job in a factory, do you think he should turn out as much work as he can, or should he turn out as much, say, as the average man in his group?

Answer:

JAN 1 7 1946

BEGINNING ON PAGE 81

LAND LIBRARY

What the Factory Worker Really Thinks

about PRODUCTIVITY, NATIONALIZATION OF INDUSTRY, and LABOR IN POLITICS

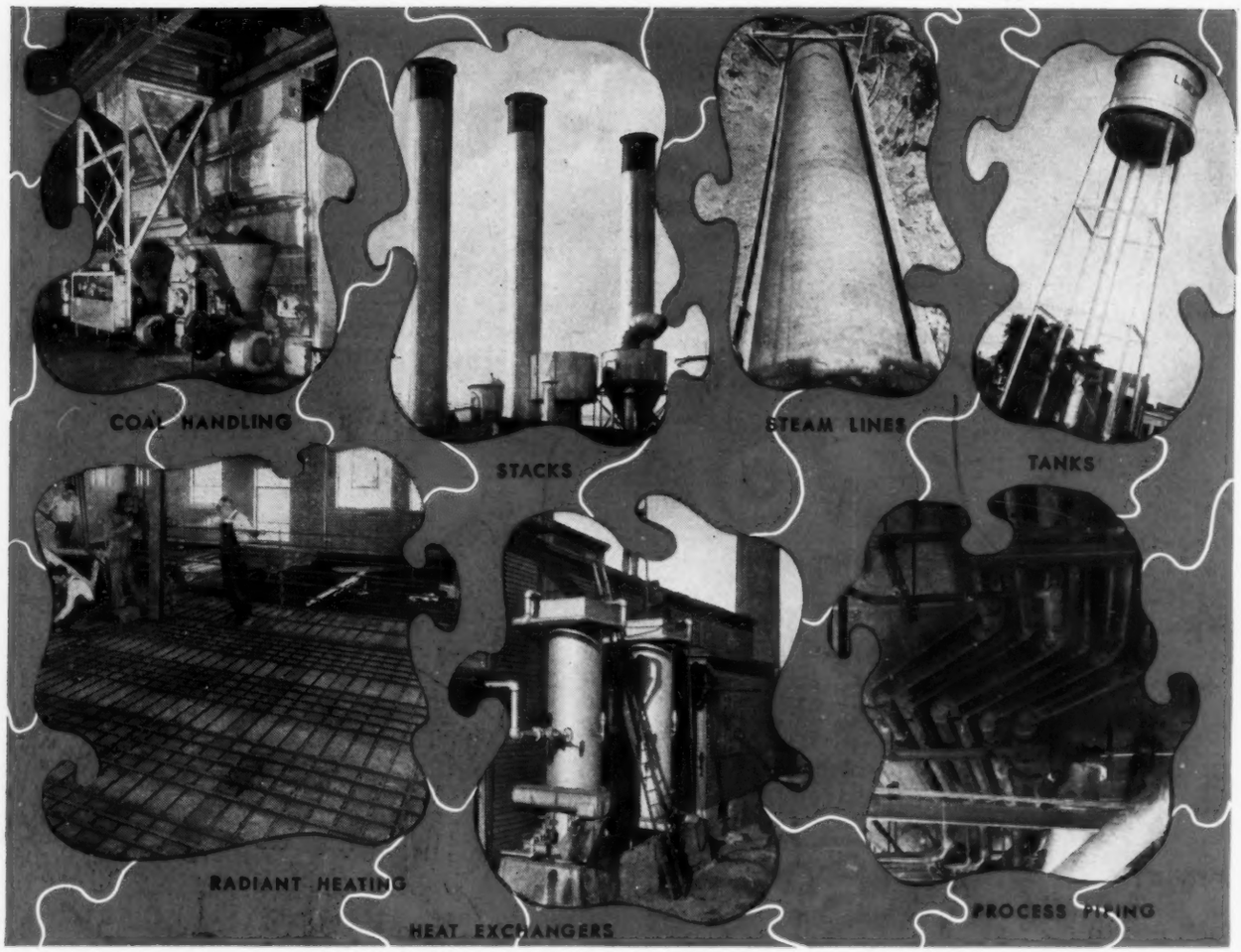
MOTIVES IN RAISING OUTPUT

those who said "average amount"): What do you think would happen if he turned out *more* than the average?

Answer:

2. UNION MEMBERS ARE MORE INCLINED TO FAVOR "HOLDING BACK" THAN NON-UNION WORKERS, WHEREAS FOREMEN AND CLERICAL EMPLOYEES BELIEVE IN FULL PRODUCTION

Also in this issue: WHAT'S WRONG IN LABOR RELATIONS . . . page 90



BYERS WROUGHT IRON

HELPS YOU WORK OUT MAINTENANCE PUZZLES

With one of the biggest plant construction and re-construction jobs in history ahead, this is an ideal time to review the maintenance record of equipment, with a view of getting longer service in the future.

An ideal place to start is with corrosive services, where premature failures can take heavy toll in time and money. The illustrations show several applications where severe corrosion can always be anticipated, and where wrought iron has helped other engineers to eliminate excessive repairs . . . and might help you.

Some of the reported experiences that support this belief include:

. . . twice the useful life from wrought iron in a coal redler,

. . . twenty years service from wrought iron in a top stack section, where average life to failure of ordinary materials was nine years,

. . . 39 years service from a wrought iron underground steam line with no maintenance whatsoever,

. . . wrought iron water tanks 50 years old, and still good,

. . . wrought iron condenser tubing that averaged over twice the life of ordinary materials.

The reason wrought iron serves so well is found in its unique structure. Tiny fibers of glass-like silicate slag are threaded through a body of high-purity iron. These fibers halt and deflect corrosive attack, and also anchor the initial protective film which shields the underlying metal.

Our General Catalog will give you complete dimensional information on Byers Wrought Iron. May we send you a copy? And remember . . . wrought iron is available now, in any quantity, for any project.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle, San Francisco.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

BYERS
GENUINE WROUGHT IRON
TUBULAR AND HOT ROLLED PRODUCTS
ELECTRIC FURNACE ALLOY STEELS · OPEN HEARTH ALLOY STEELS
CARBON STEEL TUBULAR PRODUCTS

FACTORY
MANAGEMENT AND MAINTENANCE
A McGRAW-HILL PUBLICATION

JANUARY - 1946

Factory's Second Annual Survey of Worker Opinion

What the Factory Worker Really Thinks

about

PRODUCTIVITY, NATIONALIZATION OF INDUSTRY, and LABOR IN POLITICS

This is the second of two articles (the first was in December) based on FACTORY's second annual survey of the attitudes of workers in the manufacturing industries. This new nation-wide survey, conducted for FACTORY by Opinion Research Corporation, Princeton, N. J., made use of the most modern opinion-measurement techniques. Interviews were allotted in proportion to geographical concentration of industry, type of industry, size of plant, length of employee service, age group, and sex. FACTORY believes the survey is representative of factory employee opinion throughout the nation. The findings are presented in the interest of the better understanding between management and labor which is so vital to greater industrial efficiency and lasting prosperity.

Summary of Worker Opinion

A ON PRODUCTIVITY

1. The worker isn't sure that employees should work as hard as they can and he is sometimes suspicious of management's motives in raising output
2. Union members are more inclined to favor "holding back" than non-union workers, whereas foremen and clerical employees believe in full production
3. All types of employees frown, however, on "loafing"
4. As for labor-saving machines, the worker believes they raise wage levels, but he isn't sure they create more jobs in the long run
5. When the worker is displaced by machines, he expects management to take care of him

B ON NATIONALIZATION OF INDUSTRY

6. The worker is well aware of the British Labor Party's election victory, but he is neither pleased nor displeased by it
7. He is of two minds about the benefits that nationalization may bring to the British people
8. He opposes nationalization for American industry—especially as it might apply to factories

C ON LABOR IN POLITICS

9. The worker doesn't believe in a "labor party" and has his doubts about union political activity
10. Foremen and clerical employees want labor to keep out of politics

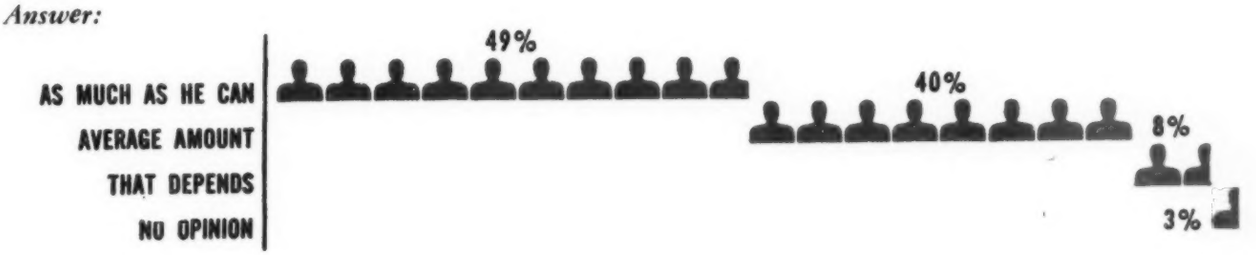
LAST MONTH *(December, 1945)*: What the Worker Really Thinks About **Wages and Hours, Strikes, Full Employment, and Veterans**

What the Factory Worker Really Thinks About Productivity

1. THE WORKER ISN'T SURE THAT EMPLOYEES SHOULD WORK AS HARD AS THEY CAN . . .

Question: When a man takes a job in a factory, do you think he should turn out as much work as he can, or should he turn out as much, say, as the average man in his group?

Answer:



. . . AND HE IS SOMETIMES SUSPICIOUS OF MANAGEMENT'S MOTIVES IN RAISING OUTPUT

Question: (addressed only to those who said "average amount"): What do you think would happen if he turned out *more* than the average?

Answer:

2. UNION MEMBERS ARE MORE INCLINED TO FAVOR "HOLDING BACK" THAN NON-UNION WORKERS, WHEREAS FOREMEN AND CLERICAL EMPLOYEES BELIEVE IN FULL PRODUCTION

Question: Same as the first question under (1) above

Here are the answers broken down by type of employee:

	UNION MANUAL WORKERS	NON-UNION MANUAL WORKERS	FOREMEN	CLERICAL WORKERS
As much as he can	43%	60%	75%	68%
Average amount	44	33	17	23
That depends	10	5	7	5
No opinion	3	2	1	4

3. ALL TYPES OF EMPLOYEES FROWN, HOWEVER, ON "LOAFING"

Question: Here's another idea. There are probably some men in your plant who loaf a little bit. Now suppose nobody loafed and everybody turned out just as much work as he reasonably could —would this help or hurt the workers?

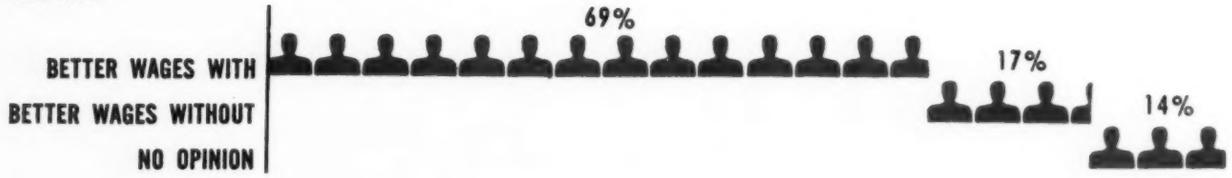
Here are the answers broken down by type of employee:

	MANUAL WORKERS	FOREMEN	CLERICAL WORKERS
It would help workers	61%	73%	67%
It would hurt workers	11	12	11
It would make no difference	11	6	8
That depends	7	5	6
No opinion	10	4	8

4. AS FOR LABOR-SAVING MACHINES, THE WORKER BELIEVES THEY RAISE WAGE LEVELS . . .

Question: What is your feeling about the use of labor-saving machines in factories? Do you think we all make better wages because of these machines or would we make better wages without them?

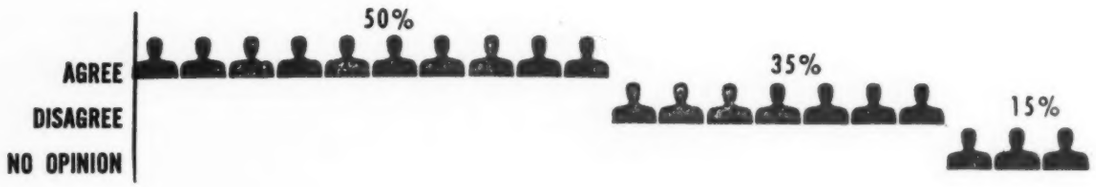
Answer:



. . . BUT HE ISN'T SURE THEY CREATE MORE JOBS IN THE LONG RUN

Question: Some people say that in the long run labor-saving machines actually make more jobs for workers. Do you agree or disagree with this idea?

Answer:



How foremen and clerical employees answered the same question:

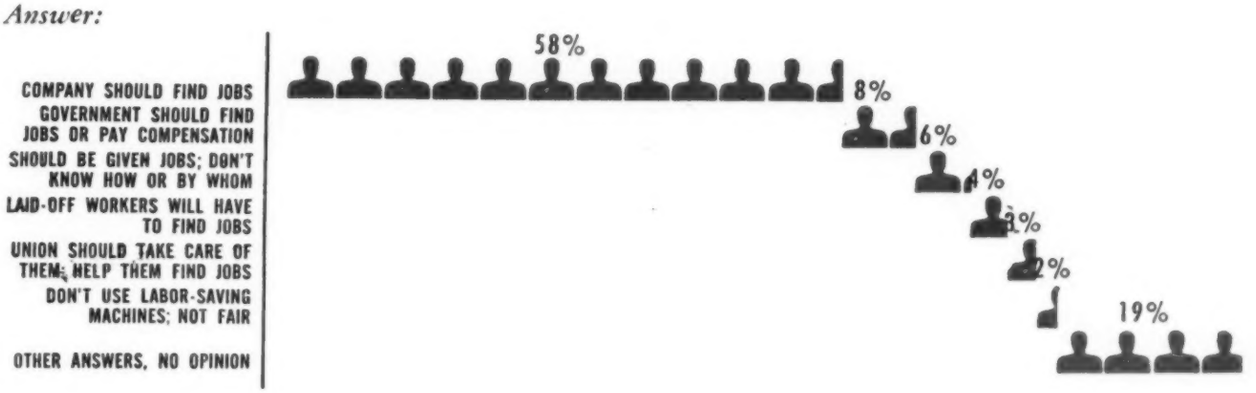
	FOREMEN	CLERICAL EMPLOYEES
Agree	71%	61%
Disagree	22	24
No opinion	7	15

---

5. WHEN THE WORKER IS DISPLACED BY MACHINES, HE EXPECTS MANAGEMENT TO TAKE CARE OF HIM

Question: In some cases, when new machines are brought into a plant, certain workers are no longer needed. What do you think should be done about these workers, and who do you think should do it?

Answer:


COMPANY SHOULD FIND JOBS
GOVERNMENT SHOULD FIND JOBS OR PAY COMPENSATION
SHOULD BE GIVEN JOBS; DON'T KNOW HOW OR BY WHOM
LAID-OFF WORKERS WILL HAVE TO FIND JOBS
UNION SHOULD TAKE CARE OF THEM; HELP THEM FIND JOBS
DON'T USE LABOR-SAVING MACHINES; NOT FAIR
OTHER ANSWERS, NO OPINION
58%
8%
6%
19%

ANALYSIS AND ADDITIONAL INFORMATION

AN INTERESTING CONTRAST is noted here. There is a good deal of doubt in the worker's mind as to the wisdom of turning out as much work as possible. Yet even the worker who believes in producing only the "average" amount doesn't think of himself as a "loafer" and resents loafing in others.

Now take the worker who says it would help all workers if nobody loafed. What is in his mind? To bring this out, an additional question was addressed to those (61 percent) who so expressed themselves.

Twenty-three percent (of the 61 percent) say: There would be fewer labor disputes; everybody doing his best would create good will between labor and management.

Sixteen percent say: Work becomes easier when all share equally; takes burden off the conscientious worker.

Fifteen percent say: Workers benefit from company prosperity.

Fourteen percent say: Workers would get higher wages.

A scattering of additional reasons, such as "lowered morale" are given, but the foremost ones are those named above. Plainly enough, the worker views the outright loafer as one who causes strikes, holds down wages, retards prosperity, and undermines morale.

These findings suggest that management may never succeed in "selling" increased productivity as an end in itself and may better turn its attack on the loafer. Though skeptical of maximum production as a goal, the worker would probably join in condemning the slowdown attitude.

When the spotlight turns toward labor-saving machinery, the picture is rather mixed. The worker believes that machines mean better wages. But he is far from convinced that machines make jobs. This does not mean that he opposes the idea; he just isn't certain.

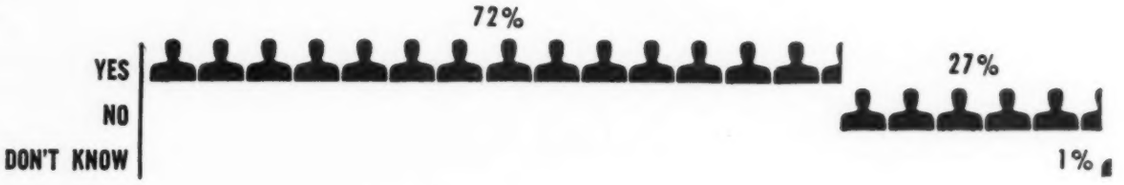
On one point all workers agree and that is that *somebody*, probably management, must take care of the worker who is displaced by machinery. Remarkably, many place the responsibility on management, few on government.

What the Factory Worker Really Thinks About Nationalization of Industry

6. THE WORKER IS WELL AWARE OF THE BRITISH LABOR PARTY'S ELECTION VICTORY . . .

Question: Did you hear or read anything about the recent British election?

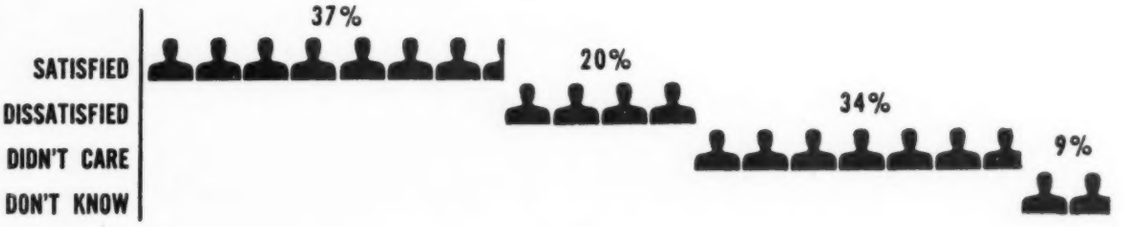
Answer:



. . . BUT HE IS NEITHER PLEASED NOR DISPLEASED BY IT

Question: (addressed only to those who had heard or read of the British election): On the whole, were you satisfied or dissatisfied with the results of the election?

Answer:



7. HE IS OF TWO MINDS ABOUT THE BENEFITS THAT NATIONALIZATION MAY BRING TO THE BRITISH PEOPLE

Question: As you may know, the new government in England plans to own and control the Bank of England, the coal mines, the electric companies, and the railroads. Do you think this is a good idea or a bad idea for the British people?

Answer:

8. HE OPPOSES NATIONALIZATION FOR AMERICAN INDUSTRY . . .

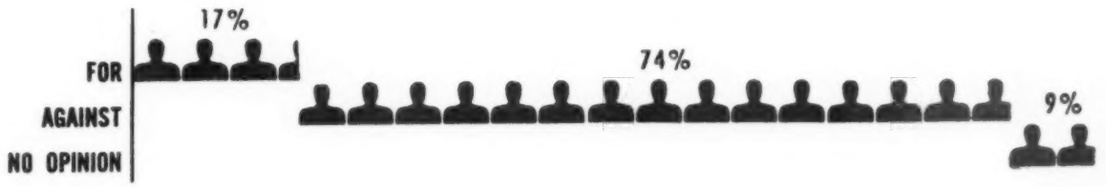
Question: Well, would you be for or against having our government own and control the banks, coal mines, electric companies, and railroads in this country?

Answer:

. . . ESPECIALLY AS IT MIGHT APPLY TO FACTORIES

Question: Would you be for or against having our government own and control the factories in this country?

Answer:



Here are the reasons given by those who said "for":

Government can manage things better than private business (26 percent); would mean fewer strikes and disputes between labor and management (20 percent); government would pay higher wages (13 percent); government would provide more jobs (13 percent); would put an end to monopolies and capitalists setting high prices and high profits (10 percent); would mean less discrimination, racial prejudice, and personal bias (7 percent); it's time we try something new (7 percent); other answers (4 percent).

And here are the reasons given by those who said "against":

Undemocratic, communistic, socialistic – would mean loss of freedom, would lead to dictatorship (33 percent); I'm for private enterprise, individual initiative, and competition – don't believe in government ownership (32 percent); government is less efficient, can't run business as well as private concerns (14 percent); too much government interference now, keep government and politics out of business (9 percent); standard of living would be lower, taxes would be higher (4 percent); other answers (8 percent).

ANALYSIS AND ADDITIONAL INFORMATION

PRIVATE ENTERPRISE can take considerable comfort from the conservatism in worker attitudes expressed by the answers to some of these questions. An emphatic 74 percent of the workers say "No" to nationalization of American factories. For this brings the implications of nationalization straight home to the worker—in his own plant, on his own job—and he doesn't like the idea of government ownership and management.

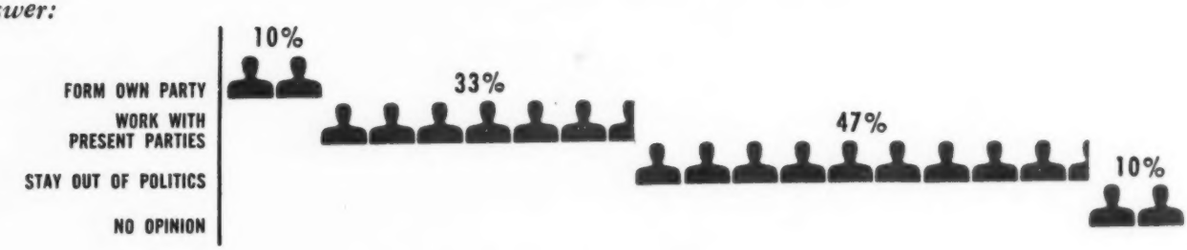
On the other hand, it should not be assumed that the American worker, in his broader reflections on the subject, is completely hostile to the nationalization of industry. There is a neat split in opinion when the worker is asked whether nationalization of banks, mines, utilities, and railroads, would be a good thing for the *British* people.

What the Factory Worker Really Thinks About Labor in Politics

9. THE WORKER DOESN'T BELIEVE IN A "LABOR PARTY" AND HAS HIS DOUBTS ABOUT UNION POLITICAL ACTIVITY

Question: Which of these things do you think labor unions in this country should do? (Interviewer then handed card to workers which read as follows: Form own political parties; work with present parties through union committees; stay out of politics.)

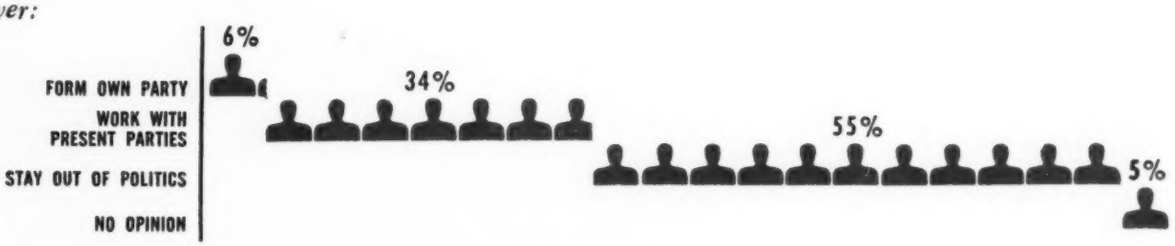
Answer:



10. FOREMEN AND CLERICAL EMPLOYEES WANT LABOR TO KEEP OUT OF POLITICS

Question: Same as above

Answer:



ANALYSIS AND ADDITIONAL INFORMATION

SMALL ENCOURAGEMENT to the politically minded labor leaders of today is to be found in the fact that only 10 percent of the workers favor a "labor party," while nearly half of them think labor should stay out of politics.

Despite the all-out efforts of the CIO's Political Action Committee, only 14 percent of CIO members endorse the idea of labor's forming its own party, while 36 percent favor working through established parties, 43 percent say "stay out of politics," and 7 percent express no opinion.

AFL members see almost eye to eye with CIO members on this question. The AFL vote: For forming own party, 14 percent; for working through present parties, 35 percent; for staying out of politics, 44 percent; no opinion, 7 percent. Only 4 percent of non-union workers favor a "labor party," while 54 percent would like to see labor avoid politics altogether.

INCENTIVES FURNISH THE DRIVE

THE COMING YEAR, 1946, and the years to follow can bring unprecedented prosperity to the people of the United States if the incentives to secure it are provided.

We have the advantage of starting with an economy which has demonstrated a capacity for expansion unequalled in any other country in the world. Our economy has demonstrated, also, one grave weakness—a recurring interruption of the upward trend of production and living standards by wasteful and paralyzing periods of recession. Recovery from each depression always has carried us to new heights of economic welfare, but the toll of the years of blight has been harmful to everyone.

The job ahead of us is a dual one. We must maintain the vitality of an economy which, over the years, has yielded an enormous increase in the American standard of living, and we also must improve its stability.

The Dynamics of American Production

In the last prewar year, 1940, the population of the United States was 3⅓ times as large as it was in 1870. But the national production, measured in dollars of constant purchasing power, was 10 times as large at the end of the period, and industrial output had increased 20-fold.

In the meantime, the average number of hours of factory workers had been reduced from about 63 per week in 1870 to less than 40 in 1940, while average hourly earnings had more than trebled in dollars of constant purchasing power. Thus "real" weekly or annual wages in manufacturing had doubled over the 70-year period, even though the work-week was cut by 35 per cent. This was made possible chiefly by a tremendous increase in the quantity and quality of the mechanical facilities which were provided in American manufacturing industry. Manufacturing capital investment per worker was multiplied by 6 times over the period in question. But the return per dollar invested, while it has fluctuated widely between good years and bad, showed no general upward trend over that portion of the period for which measurement is practicable.

Incentives in American Manufacturing

There has been, historically, a remarkably consistent pattern in the division of the realized income from the expanding manufacturing output of America. Reliable statistics are not available for as far back as 1870, but from 1899 through 1939 the average share of wages and salaries has been 82½ per cent against 17½ per cent as the share to investors (including dividends, interest, rents, royalties, and non-corporate profits). There have been, from year to year, relatively minor divergences from this pattern of distribution, but there is no discernible trend during the period away from the averages cited.

It is suggested that the persistence of the average 17½ per cent share of realized income from manufacturing that was maintained for the 40 years preceding World War II may represent the proportion that is needed to produce the dividends, interest, rents, royalties, and non-corporate return that will provide for the continuing investment upon which an expanding productivity such as we have had in the past depends. At any rate, it would seem reckless to depart too radically from such an established pattern at a time when unprecedentedly large private capital investment is counted on to make up for the drastic curtailment of such investment during the war years, and to carry us to the new high levels of civilian production set as our postwar goals.

The Distribution of Manufacturing Income in War

At the beginning of the war, the Government adopted controls and a tax program designed to prevent wartime activity from resulting in un-

duly swollen private returns. Due primarily to huge volumes, the profits *before* taxes of manufacturing industry were very high, but throughout the war its profits *after* taxes averaged returns no larger than they had been in good prewar years. Relative to volume, they were considerably lower than in prosperous years in the past. Again, there can be no complaint at results that generally were in accord with a national wartime policy.

But it is fair to note that the wages of manufacturing labor were allowed to increase substantially during the war. Between January 1, 1941 and April, 1945, average weekly earnings per worker increased by 77 per cent. This was, in considerable part, a result of increased working hours and a shift from low- to high-paid industries, but straight-time hourly earnings on the same jobs increased about 40 per cent against a cost-of-living rise of about 30 per cent.

The net result was to alter drastically the 40-year relationship of the 17½-82½ per cent division of Realized Income from Manufacturing. The share of wages and salaries increased to over 90 per cent, and the investment share shrunk to less than 10 per cent.

Its Postwar Distribution

This wartime shift in the proportion of distributive shares has an important bearing upon current wage controveries. With union demands for wage increases ranging up to 30 per cent, and the economists of the Office of War Mobilization and Reconversion asserting that an average increase of 24 per cent is feasible without raising prices, it is pertinent to inquire how such increases would affect the prewar ratios that governed realized income distribution in manufacturing.

Forecasting is always hazardous, but if we assume (1) that in 1946 we shall reach the $160 billion level of national output which the Government proponents of general wage increases expect, and (2) that there will be little increase in productivity because of the continuing process of reconversion, and (3) that the Government will succeed in carrying its announced purpose to maintain present price ceilings, it appears that a 24 per cent general wage increase would reduce the share going to capital from 17½ per cent to 11 per cent even allowing for its increased return resulting from the repeal of the excess profits tax. The prewar ratios would be about maintained if wages remained at present levels.

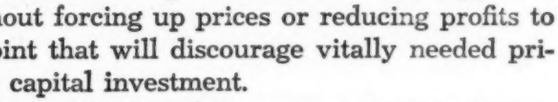
Conclusion

Since the maintenance of these prewar ratios was accompanied by an unparalleled rise in the "real wage" of American workers, there is a powerful prima facie case for not tinkering with them. It should be noted, however, that some economists think that the size of the investment share of manufacturing income tends to provide more capital than can be absorbed by a mature economy, and thus contributes to those breaks in the expansion of the economy which, as stated at the outset, have been its principal blight.

Regardless of what may ultimately prove to be the validity of this view, no one can responsibly contend that at this early but crucial stage in the reconversion process is the time to test it. Now, no one knows whether, or what dimension of, additional wage increases can be supported without forcing up prices or reducing profits to a point that will discourage vitally needed private capital investment.

We want high and increasing wages in American manufacturing. We need them to provide an active incentive to workers to support expanding productivity, as well as to continue the trend of rising living standards in America. Equally, we need a continuing profit incentive of sufficient attractiveness to call forth the new investment upon which expanding productivity depends.

We can never attain our dual objective if we push one of these aims so far and so fast that it defeats the other.



President, McGraw-Hill Publishing Co., Inc.

FACTORY
MANAGEMENT AND MAINTENANCE

L. C. Morrow • Editor

Once Again the Balance in Labor Relations Must Be Corrected

IT COULD BE that the time has come when organized labor has outsmarted itself. Congress, in its present mood, may go much further than President Truman suggested when he proposed a law authorizing fact-finding committees and suggested "well-reasoned and workable legislation . . . to provide adequate means for settling industrial disputes and avoiding industrial strife."

Correction in labor relations is needed. Our labor laws are one-sided. They over-correct for the out-of-balance that once favored management. Now over-correction in the other direction must be guarded against.

BUT organized labor, as represented particularly by the CIO, has been asking for it. By not preventing work stoppages. By wanting privilege without responsibility. By hindering reconversion and the production of needed civilian goods. By trying to dictate prices and profits.

What has happened during the 30's and 40's is well told in this issue in the four articles presented under the title, "What's Wrong in Labor Relations."

One of these articles is by Frank Rising. Many of FACTORY's readers know Rising, either personally or by reason of his writings. They will remember what a firm and consistent advocate he was for labor's rights, and how sincerely he sought for labor the right of true collective bargaining. Against this background they cannot help be impressed by "The Labor Problem as I See It."

Another of the articles tells of the disillusionment of the Sinclair Oil management. In 1934 this company of 20,000 employees took what it considered the very constructive step of signing a contract with the union. There was nothing to force this action. There was no Wagner Act. There was no NLRB. The long-time readers of FACTORY will remember our report of Sinclair's action—a report that included all details of the contract. How Sinclair feels after 11 years is told in this article.

The author of the third article is another man well known to FACTORY readers—Whiting Williams. For longer than he cares to remember, Williams—worker among workers, self-appointed 'bo among the unemployed, world traveler as observer in the field of labor, author and consultant in the field of human relations, editorial consultant for FACTORY—has preached forbearance on the part of management, recognition of labor's rights, cooperation with labor. His article shows another disillusioned and a disappointed man.

In the fourth article Lee Hill, alternate delegate from management to the recent Labor-Management Conference, and formerly member of the War Labor Board, reports his conclusions about organized labor's present attitude in these words:

"The most tangible result of the National Labor-Management Conference is that it must have demonstrated to the federal government under circumstances too solemn to be laughed off that the leaders of the union labor movement in America will not voluntarily accept any fair and practical program to reestablish and preserve labor-management peace . . . What chiefly defeated the main purpose of the conference was that the union delegates refused to accept some of the most essential provisions submitted by management for peaceful settlement of strike causes."

The battle for recognition is over; unions have had time to grow up; broadminded and powerful leaders should have developed. It is sincerely regretted by all who have worked to bring about industrial peace and management-labor cooperation that labor relations are in a mess today. They are, though, and something will have to be done about it. Labor has rights but, like all other "rights," they must be restricted at the points where they interfere with the rights of others.

Full Acceptance of Sanctity of Contract Is Needed in Industry

BOTH UNIONS AND MANAGEMENT must gain each other's confidence concerning the sanctity of contracts. Unless such confidence is built up, industrial conflict will continue to handicap our economy.

Repeatedly unions claim that the workers dare not produce as much as they could because of the certainty that, by some means or other, rates would be cut.

Slowdowns and stoppages by workers in violation of contracts between unions and manufacturers are matters of common knowledge.

Everyone in management knows that a piece rate or a time standard set by management should be considered as a contract between management and workers. Likewise, everyone in management knows about some of the evasions perpetrated by some units of management in order to reduce rates.

Everyone in organized labor knows of unjustified or wildcat strikes—of slowdowns to thwart discipline.

These matters should not be matters of collective bargaining. They should be matters of plain honesty. Management is going to have to show the way. The majority of management does not cut piece rates or time standards. However, not enough workers are convinced that this is so. A published statement by management that it will not make cuts without major change in method, tooling, or equipment, distributed to its workers, followed by some years of demonstration that the statement was not only idle words, would establish worker faith in employer integrity.

Management would then be in a much firmer position in its demands for the elimination of slowdowns, stoppages, and strikes in violation of contracts.

WHAT'S WRONG in

A timely round-up by four men who know a great many of the answers—as follows: *Frank Rising,* The Labor Problem as I See It; *Daniel T. Pierce,* How the Union Disillusioned Us; *Whiting Williams,* The Public Is Fed Up With the Labor Mess; *Lee H. Hill,* Why the Washington Conference Failed

The Labor Problem as I See It

FRANK RISING

THERE IS ONE PARAMOUNT LESSON implicit in the industrial chaos which has spread throughout the country since V-J Day and which will continue to wreck the hopes of fair-minded management and intelligent labor leadership until a new code of ethics is recognized in labor relations. It is this:

"Collective bargaining" as we have known it for the past ten years in steel, automobiles, oil, transportation, and a number of other industries, is done for.

Close students of labor relations know that the post-war breakdown is no minor or temporary phenomenon. They know that it has been in the making for several years—roughly, ever since the end of the 1936-1939 struggle over union recognition. The breakdown has been predicted. The dismal failure of the President's management-labor conference was forecast. It is only surprising to informed observers that so many people, particularly in Washington, still feel that, once "steam has blown off," the terrible confusion in labor relations will transform itself into orderly and lasting harmony.

The causes of our failure are deep, obstinate, and fundamental. They can be clearly demonstrated and diagnosed and—most important—*they can be cured.* But the task of producing standards for collective bargaining which will really work for lasting benefit to the whole economy is not going to be completed easily, or quickly.

Background of the problem, and the prospects for the future, might be summarized in this way:

1. Public opinion has gradually changed from being in favor of giving more power to the labor unions to being in favor of controls over unions to prevent widespread abuse of those powers.

2. The inadequacies of the outmoded Wagner Act, in view of today's problems, are such that new legislation is bound to come. It is still some months away, but is now certain.

3. Management policy for the first time is genuinely objective, practical, and progressive. There is little chance that expedience again will become a dominant note. The new firmness, based on a determination to *make collective bargaining work,* can be expected to continue and to grow.

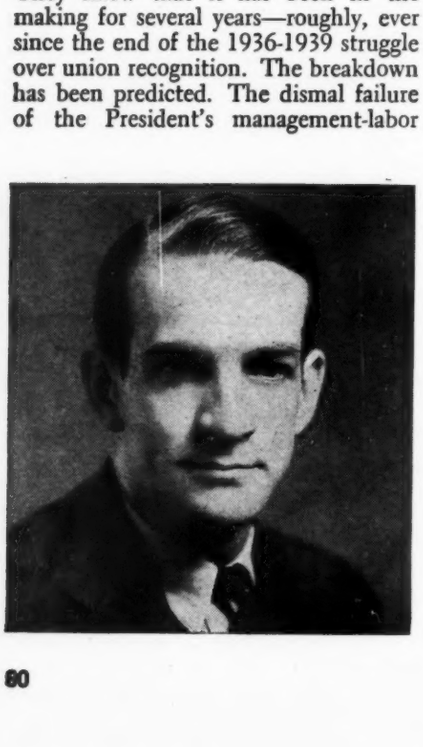
4. Organized labor, confused by the abrupt end of wartime favors and by the intransigence of CIO policy, will rebuild its house. Those who believe in responsibility and integrity will gain the upper hand, but it will take time. Probably two years of difficult times for the unions lie ahead.

5. The net result of the changes which are necessary and inevitable will be a far better system of collective bargaining and the first actual "coming of age" in industrial labor relations.

It must be noted and emphasized that these developments are for the greater part *not yet accomplished.* The new management policy has amazing depth and strength, but very few companies as yet have stated it. The change in union ranks from short-term thinking to more mature and lasting policy is evident only in a few non-CIO quarters and not at all in CIO itself. The Congressional and Administration thinking is still largely uninformed and hazy.

Until these changes *do* occur, however, there will be no lasting peace in labor relations. Patchwork settlements of the current strikes won't stick. The factors that brought about the confusion cannot be wished away.

It is fortunate, in a way, that we have the past ten years to look back upon.



FRANK RISING

A former labor reporter for *Factory* and *Business Week.* For the past six years, general manager, Automotive & Aviation Parts Manufacturers, Inc. Industry member, War Labor Board. Also Commissioner of Transportation, City of Detroit (during his tenure no strikes among some 7000 employees, both CIO and AFL). Rising predicted the rise of CIO, and for the past two years has forecast the collapse in labor relations post-war.

LABOR RELATIONS

Press Association photograph

What kind of leadership is it that encourages striking union workers to leave the job like a bunch of whooping school boys released for the holidays? Is it not time to surround the workers' right to strike with some of the same controls that govern all the other inalienable rights of American citizens?

We learn by experience, slowly and painfully, but surely. The phrases which we were using in 1935, 1936, and 1937 to calm our apprehensions will not suffice today, but the very fact of having discovered our weaknesses will help in finding a sound solution. Let's look at some of those phrases of yesterday:

"Management must quit fighting against recognition of unions properly chosen by the majority of the company's employees."

Management did quit fighting against recognition. For a time there was bitter opposition in many quarters, but the truth is that today there isn't a contest over union recognition worth mentioning.

"The new unions are young. Their leaders are young. With more experience there will come maturity and a sense of responsibility."

Ten years have gone by. The "new" unions are not young. Their leaders are not young. Today they have more difficulty in exercising any real leadership than they did in the beginning, and their position as real leaders is steadily deteriorating.

"All that is necessary is to accept the law of the land, and honor it."

The law referred to is the Wagner Act. It was designed and passed with a specific and narrow objective: *To prevent "unfair labor practices" from blocking the organization of unions and to insure the recognition of majority groups.* Like a policeman assigned to one side of a busy street, the NLRB does not—and cannot—pay any attention to the other side of the street. The Wagner Act guards *recognition*, and that is not enough.

There are more phrases of this kind, and almost anyone can recall them. The easy generalizations now have a hollow sound; the man who uses them betrays the fact that he is inexperienced, naive, and not familiar with the true facts. It is regrettable that these phrases are still used; one hears them in the halls of the Department of Labor, strangely enough. But they are heard less frequently.

A critical comparison of the situation and viewpoint of organized labor and of industrial management, as they exist today, will help further in understanding how much times have changed. These observations are presented without partisanship or prejudice, save for an admitted prejudice in favor of progressive, successful collective bargaining.

How Organized Labor Sees the Problem

It is necessary to take account of the differences between CIO and the rest of organized labor. AFL spokesmen, John Lewis, and other non-CIO labor leaders are products of slow growth. They believe that the competitive profit-making system is a good one, but also believe that they have to watch closely and fight

hard for their share of the pie. They support the idea that you have to work to make some pie before shares can be cut. They not only believe, but also insist, that the elected union leader must have authority, and that locals must heed executive rulings. (Murray and Hillman also believe this, but they can't make it stick.)

CIO, far from having a slow growth, with some ups and some downs, never until now has faced a serious decline. It never has lived in a normal world. Nurtured by government, flattered and pampered with special attentions, CIO rushed through the years from 1936 to 1941 like an ever-victorious football team. The war then brought still more flattery. Local union representatives who at best have been "leaders" for four years or so were invited to sit with the mighty in Washington. Some even became worldwide "statesmen" and dreamed of the day when they would sit at the head of the universal labor table, in control of Destiny itself.

With such a run of luck, there was no apparent need to build a line of authority and responsibility within the industrial unions, and it wasn't built. On the contrary, the CIO "line" as consistently displayed in its newspapers and by its spokesmen was a vehement espousal of a wonderful type of "Democracy." Under this form of democracy the rank and file can and does howl down the advices of the more conscientious spokesmen. The local union president who favors discipline and responsibility is ignored or unseated. Locals give orders to internationals, and internationals give orders to Phil Murray. When a disciplinarian and contract-observer like Dalrymple of the Rubber Workers tries to impose penalties for obvious dereliction of duty, the word goes around that Dalrymple is through. And he *is* through.

Important as the lack of authority and discipline within CIO is, however, it is not more important than the cultivation among the rank-and-file members of class consciousness, hatred, greed, and fear. The CIO union member is not prepared to take a cooperative part in making collective bargaining work; he is encouraged to hate and despise the very individuals who are invited to sit down at the table and bargain. Employers who have complete contracts with the union and who have granted every concession possible are called "sweat-shopper," "union buster," "price gouger," "fascist," "labor hater," and many other things.

It is small wonder that confusion and hysteria dominate the CIO today. From a peak of popularity and success the organization has fallen rapidly to its present position. It has lost about half of its dues-paying membership and has not husbanded its funds. John Lewis and the AFL are getting stronger. The PAC is losing elections. And Congress is beginning to be quite skeptical about some of the CIO threats.

CIO's viewpoint, then, can be cut down to this: *It has to continue the only policy it ever had, has to strike, has to threaten Congressmen, has to promote class hatred and warfare. And perhaps the gravest problem it faces lies in the new viewpoint and in the new policy of management.*

How Management Sees the Problem

It is in this area that the most notable change has occurred. Management now is the party that demands workable labor contracts. And management is very firm about it. Unions are accepted, collective bargaining is accepted—but unless responsibility to keep the contract is defined and accepted, the contract is worthless.

The approach made by Ford to its union recently is typical of the new thinking of management. Ford simply said: "We gave you security (with a union shop and check-off!). Now how about giving us security?" (*Editor's note:* For full text of the Ford statement, see page 278.)

To this the CIO immediately replied that the company was only interested "in perpetuating starvation wages"—this of Ford, whose wage scale is not only the highest in Detroit but also the highest the world has ever seen!

Management is centering its attention on two things: *Productivity and observance of contract.* If it cannot get them, it cannot plan for the future, it cannot drive reconversion into prolonged high production and prosperity.

On this question the words of Harry Shulman, impartial umpire at Ford's during the war, are noteworthy. Shulman has no partisan axe to grind. Selected and paid by both union and management, he is one of those "middle men" of high distinction who see both sides. This is his comment in one of the Ford cases:

An employer cannot honorably be asked to observe strictly his own contractual obli-

Press Association photograph

First real setback to rapid reconversion of American industry from wartime to peacetime manufacturing came when UAW called out workers from General Motors plants. The 1946 cars the public is so anxiously waiting for—and needs so badly—stopped rolling off assembly lines. What may be the biggest, costliest, and most disruptive strike in our industrial history had begun

gations if similar observance is not enforced upon the employees. Nor can the employer be inclined to make concessions in collective bargaining if the efficiency of his business is continually subject to incalculable impairment by sporadic, big and little, unauthorized stoppages during the contract term at the whim of any minor official or small group of employees.

A test of strength by strike can be expected and planned for in the securing of a new contract. Once the contract has been executed, however, its performance for the benefit of both sides can be possible only if production is permitted to continue in the contemplated manner for the duration of its term.

These are fair words. They make sense. In Detroit, where some thousands of stoppages "big and little" have occurred during the period of the "no-strike pledge," they make particularly good sense. At Ford's during the past four years there have been 773 such stoppages under the biggest union-shop and check-off contract the CIO ever obtained—a contract hailed by UAW and Phil Murray at its inception as the finest ever written. True it may be that the company has some errors of its own to admit, but the blackness of the union record cannot be lightly shrugged away. It is there for all to see.

What are the solutions? They can be more readily set down in type than they can be acquired. Illustrative of this point is the fact that many union leaders *cannot make good* on promises of respectability and responsibility. They can repeat the promises that they have made in past years—but how can they keep those promises if the rank and file choose to ignore them? If the leader of the wildcat strike is disciplined, he may raise a group to unseat the leader who imposed the discipline. Almost all of the CIO leaders are afraid of this, from the smallest local president up to the top of the heap.

The plain fact is that it can't be done —until we get some legal teeth in our labor law to penalize the individuals who break valid labor contracts. We can't get the legal changes until a proper code of ethics in labor relations is drawn up and brought to a point of majority favor.

In this there need be no expectation of public help from the CIO. Its spokesmen cannot admit irresponsibility, cannot admit that the Wagner Act is not a wholly good and sufficient code. The fair-minded CIO leader must hope wistfully that somebody comes to his aid —if he speaks out against the wild men in his union, he stands a very good chance of losing his job. And the sum of it is that many unions will *continue* to lack a proper sense of balance and restraint until a public obligation is imposed by law.

In the meantime, some managements and unions here and there may succeed in signing new contracts, with certain penalties approved for violation. This will be a step in the right direction, but all of the reasons for failure listed above will still apply. Education of the rank and file has not yet begun —worse yet, the approval of anarchy is still evident in many places.

It is worth while to consider briefly the present tenets of management, and to keep them in mind as the time goes on. Some of them are:

1. Productivity, or efficient use of man-hours, is a necessity in our competitive industrial system. Lowered efficiency through deliberate reduction of production levels, slowdowns, "quickies," and the like must be condemned. Extension of new devices to pay for idle time will have to be denied; in fact, these tendencies must be reversed in some places.

2. A promise made must be kept. Employees themselves must learn this—they must learn that, even though a representative may sign the contract, the employee has an obligation to keep it, and can be penalized if he doesn't.

3. A fair day's pay for a fair day's work is the basic bargain. Both sides have an obligation to state the definition of what is fair on either point.

4. "Bargaining" does not mean that one side has all the grievances and the other side makes all the grants. If we are to have true and lasting bargains, "give and take" must come to have concrete meaning and balance. Up to now, regrettably, the majority of our newer union members have been taught that it should be all *give* on one side, all *take* on the other—as a matter of right.

5. Management has obligations to others. It has stewardship and responsibility to the stockholders and public as well as to employees. It has certain functions which it should discharge without union interference. These must be recognized by employees as well as by their representatives.

If management succeeds in getting these points accepted, the day of true and lasting collective bargaining will be with us. Management has some things to promise in exchange: It must reassert its willingness to accept in good faith the majority choice of its employees for representation. It must guard against abuse of the contract from its own side, constantly and zealously. It must take a more forthright and conscientious stand in helping educate its employees to a realization of their responsibilities and their rights.

If predictions are in order, this writer would emphasize one above all others: That we are a long way from being out of the woods. The immediate future is dark. Our hurdles are high. And optimism is low. There is a very real prospect that renewed jurisdictional wars will break out between CIO and AFL, and the problem of the veteran is still unsettled. The CIO may go the way of the Knights of Labor—it has failed to turn a labor movement into a political movement, and thus far has not

managed to halt the deterioration and disintegration of its structure.

The decline of CIO, however, does not mean that unionism is declining. Even if some of the internationals fall into disgrace, the locals are still strong, and many managements are dealing with them without help from the international representative. In one Detroit plant where UAW-CIO has a contract there has not been an international man on the premises for six years. Many other locals are laws unto themselves—and if they got a bid from "John L." they might listen. Particularly if he was running the AFL.

These are not things that *will* happen—they are things that very well might happen if the present situation in CIO continues. We emphasize them mainly to point to the obvious: *Unions and collective bargaining will go on, with changes, but probably to be stronger in the future.*

This is the way it should be. Management wants *strong* unions and responsible unions if it is to have contracts with them. The weak union is no good, and that is why the contract is no good—which has been amply proved over the past few years.

Meanwhile, Washington is far back of the position of knowledge and surefootedness it should have reached by now. Unwillingness to admit that there are abuses which our present labor laws do not recognize and which our labor contracts do not touch, is the major fault. Our government servants will have to learn what the facts are before we get a lasting solution. The Labor Department, headed by a well-meaning but inept and inexperienced secretary, is like a rowboat in the rapids, with no compass and no rudder. Sooner or later Congress must throw it a line from shore, in the shape of specific legislation much better than the Wagner Act.

How the Union Disillusioned Us

DANIEL T. PIERCE

WITH THE LABOR PROBLEM becoming more pressing from every side and taking on new and ominous aspects, some lessons of a long experience may be illuminating and helpful in the search for a way out of a menacing situation.

The immediate experience referred to had its origin in the conclusion reached by H. F. Sinclair in 1933 that the best way to establish good labor relations was by means of agreements with labor unions. There was no compulsion to adopt this as a policy for a company employing more than 20,000 people. The National Labor Relations Act was not in existence. The oil industry east of the Rocky Mountains was unorganized. Sinclair's decision was based on his own idea as to sound policy. He consulted William Green, president of the American Federation of Labor, as to procedure, and the result was the first national labor contract in the oil industry, dated May 31, 1934.

The president of the Oil Workers Union (then AFL) and the president of the parent Sinclair Company, "or someone designated by him," were the principals of the transaction. I was the person designated by Sinclair to formulate and carry on under the agreement. I have done so for eleven years, with the purpose and desire to make the experiment a success.

The experiment ended in disillusion when the union, in September last, called strikes against Sinclair and a dozen other oil companies in violation of its no-strike and arbitration agreements—agreements willingly and freely entered into by the union.

Long before this event it had been evident that the hope of an amicable working agreement with the union was going on the rocks mainly because of the irresponsibility of the union and the extravagance of its demands, not only as to wages—that was to be expected—but also for a closed shop and innumerable rules, all of which cost money and diminished the freedom of management to control its operations.

The conclusions here drawn are my own, and are set down more in sorrow than in anger. They may have educational value for labor union officials if they realize that they, as well as management, have much to learn.

One of the first things we learned was that union officials, national as well as local, were merely title holders. They were unable to lead, even when they desired to do so. They were puppets of the rank and file. Over and over again we were told, in confidence of course, by the union officials that they knew demands or grievances were unreasonable but that they, the officials, had to present them because their constituents so insisted. In the case of an outlaw dues inspection shutdown in a refinery, the president of the union, when asked why he did not take action, replied that if he tried to curb or discipline the outlaws he would not be president very long. Under the usual set-up, union candidates for office are expected to promise more, and get more, for their members than present or past incumbents were able to get. If elected, they try to make good their promises and retain office. The most unreasonable and loudest talkers must be pacified.

This pattern goes down the line to

DANIEL T. PIERCE

Under the title, "No Strikes, No Lockouts," *Factory* (in July, 1934) told the story of the AFL-Sinclair collective bargaining agreement. It was "a noble experiment." Daniel T. Pierce—he is assistant to the president, Sinclair Oil Company — was the man chosen to carry on under the agreement. He has done so for eleven years. Now the experiment has ended in complete disillusionment, so far as Sinclair is concerned—and Pierce, writing more in sorrow than in anger, tells why.

the officials of locals who, when they are bad, are more difficult to deal with than general officials. In many cases, the latter will privately agree that committeeman X of a local is impossible, but in no case, in my experience, has the union removed or suppressed the impossible individual. The management must get along with him as best it can. If he is discharged, the accusation of union discrimination is hurled and a strike is likely. The unruly and obstreperous local committeeman is a major problem of management and of the unions—almost as great a problem as the spineless "international" official at the top.

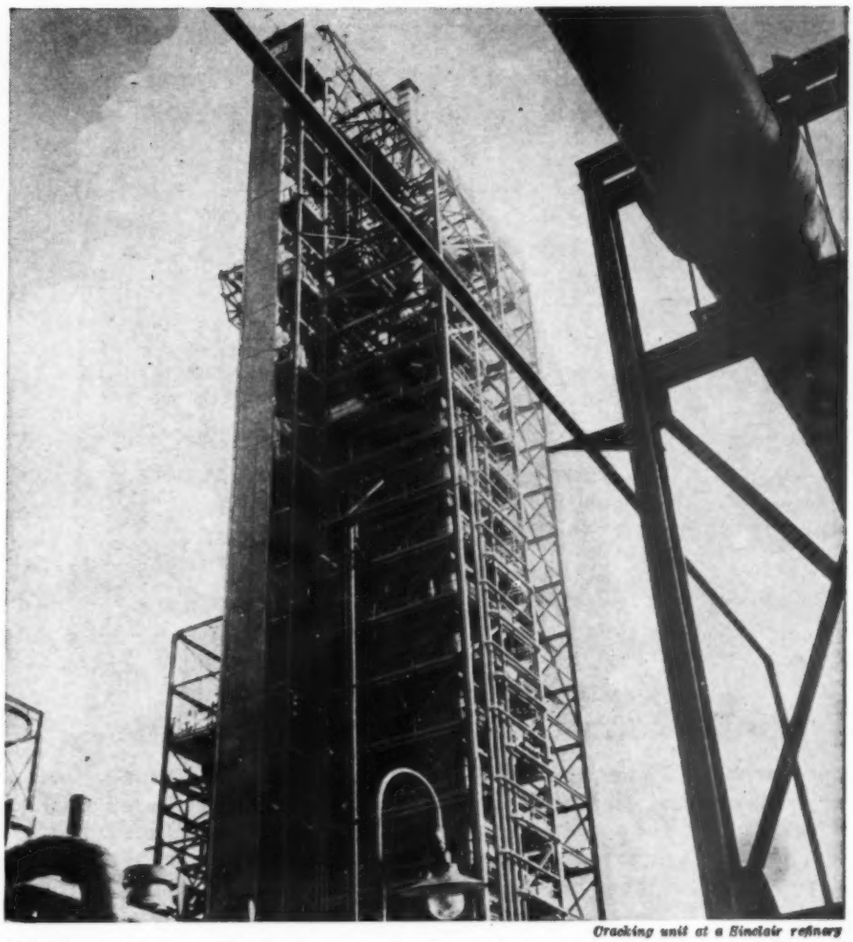
The Union Invariably Upholds Its Bad Boys

Lower management also contains bad boys who do not like unions and will give them the worst of the deal whenever they can get away with it; but top management does not condone or uphold its bad boys. The union, in our experience, invariably does so—even in cases of assault, and in one case of murder. In a proved case of a slowdown, costing the employer hundreds of thousands of dollars, the union, metaphorically, shrugged its shoulders and made a vague promise to try to get the man who ordered and organized the slowdown to mend his ways. He has not done so up to this time.

The cure for this condition is entirely within the hands of the union. It can choose sane, sound men who will fight to the last ditch for the workers' rights, and have the courage to tell their followers when they are wrong. If labor-industry relations are to be based on agreements, a requirement that unions shall impose penalties and disciplinary measures, to be applied in cases of breach of these agreements all down the line, is urgently needed.

Union spokesmen will say that this is impossible. If so, union agreements are not worth the paper they are written on.

That labor union leadership has deteriorated in nearly all fields is apparent. This deterioration began with the emergence of the Congress of Industrial Organizations, which brought forward a large number of untrained officials at the head of the theretofore unorganized, undisciplined groups. Men like William Green, John P. Frey, and John L. Lewis have not developed. Men of the Green and Frey type command respect. Lewis is a tough customer, but on the basis of an experience of a quarter-century, it can be asserted that his spoken word is better than a signed and sealed agreement with the new type of official, who regards agreements as something to be tossed out the window if that serves an immediate purpose.



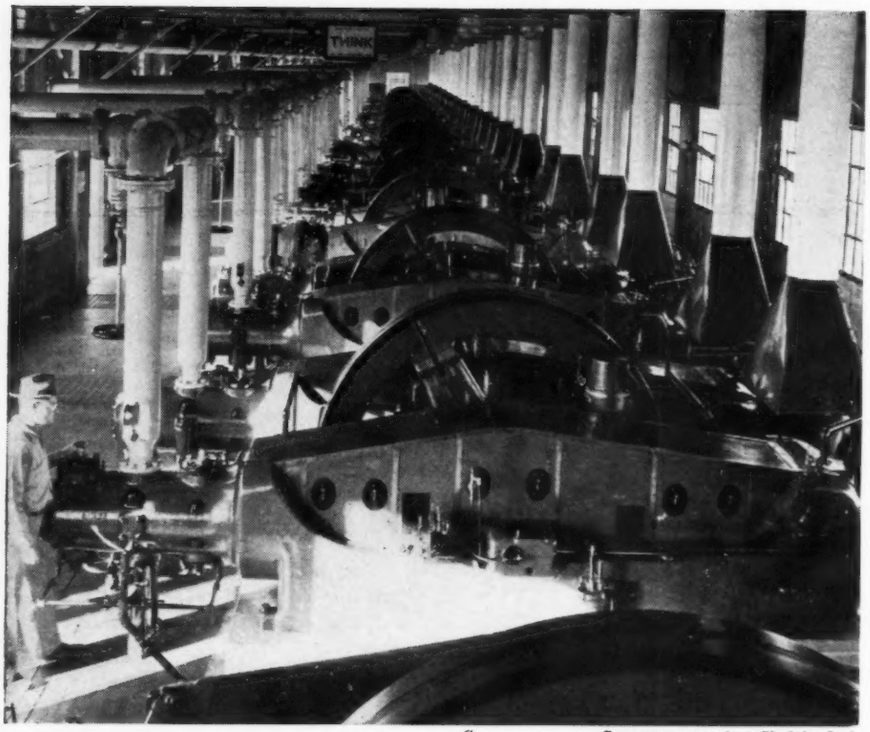
Cracking unit at a Sinclair refinery

If labor-industry relations are to be based on agreements, says Daniel Pierce for Sinclair, a requirement that unions impose penalties and disciplinary measures, to be applied in breach of agreement all down the line, is urgently needed. Union spokesmen will say this is impossible: if so, union agreements are not worth the paper they are written on

These two words, collective bargaining, constitute one of the most cruel practical jokes perpetrated in our times. Bargaining—horse trading—is as old as history. It long antedated the National Labor Relations Act. It gave collective bargaining its modern meaning and legal status. How it works in practice is well known to every management, but a true picture of it has not been exposed to the man in the street, to whom the words "collective bargaining" mean something altogether reasonable.

The actualities of collective bargaining are something like this:

The union prepares for its demands or requests by throwing into the hopper everything that the officers or members can think up. Usually pre-negotiation meetings are held, and all hands are notified to contribute. When all the demands are in there may be as many as 70. Armed with this list, the collective bargaining meeting is called. Every demand must be explored; otherwise the employer is guilty of refusal to bargain. The union negotiators find it difficult to eliminate a demand because, whatever they may think of its importance, there will be some groups to which that particular demand is a vital matter. The employer rarely has any demands to present. As far as he is concerned, the bargaining consists of trying to eliminate or change demands he considers impossible to grant. If there ever has been a collective bargaining out of which the employer got anything, it is not of record. The objective of the bargaining is to ascertain what the employer will concede—not what he will get. Serious abuses may have arisen, conditions may have changed, making revisions of the previous agreement necessary. In such cases it is practically impossible to revise a labor agreement if there is the slightest suspicion that the union may be giving up an advantage that it has already obtained. If an impasse is reached, the employer is faced by a strike or the alternative of reference of the dispute to the War Labor Board



Compressor room in a Sinclair plant

One of the first things Sinclair learned was that union officials, national as well as local, were unable to lead even when they desired to do so. Over and over again Sinclair was told by union officials that they knew demands or grievances were unreasonable, but that they, the officials, had to present them because their constituents so insisted

or the National Labor Relations Board. That is collective bargaining as it has come under my observation.

In the Sinclair, as in most, labor agreements, the handling of grievances is an important feature. Under the complicated seniority, overtime, and other provisions of labor agreements, there is plenty of opportunity for grievances. Every employee is a potential complainant at one time or another on one or more grounds. Management often makes errors; many grievances are justified. But management's errors are usually adjusted locally by supervisory officials who have at their disposal expert advice as to what their decision should be. They do not make decisions unless they feel sure that they are right. This does not stop endless appeals to top management to review local decisions, and the union professes to be mystified as to why not one appeal in twenty-five results in reversals of local decisions.

The reason, as indicated, is that the decision of the lower "court" was most carefully arrived at, often in consultation with lawyers as well as labor experts versed in contract interpretation and the facts of the case. Here, again, the top officials of the union could save themselves and management a lot of time and trouble if they would refuse to appeal unfounded grievances. In most cases, these appeals show by their content that no investigation has been made. The head office of the union has simply accepted the local's statement of facts, and acted on a demand that pressure be applied to bring about reversal of the local management. Occasionally, effort is made to show why the locally made decision is wrong. Usually, the appeal simply recites the original complaint, ignores the local management's statements of facts and reasons for its findings, and asks that the complaint be upheld.

Complainant Is Given the Benefit of the Doubt

Correction of this phase of union trouble may be brought about by great patience and great care on the part of management to make sure that it is right and to prove it to the satisfaction of the dullest mind. Our policy has been to give complainants the benefit of the doubt in hairline cases. It is not wise to allow employees to think, even mistakenly, that the employer is not giving them a square deal.

An obvious requirement is that those handling grievances be fair and exact. On the part of the unions, the need, as already indicated, is for courage enough to refuse to take up invalid complaints, even if insisted upon by local individuals or groups. The need for this reform is indicated by this actual case:

The chairman of a workmen's committee was called to the superintendent's office to be reprimanded for loafing while he was supposed to be on his job. He did not deny the charge, but put in a claim for 15 minutes' overtime occasioned by the interview. When this was refused, the international office demanded arbitration of the complaint. This necessitated the appointment of two arbitrators, and a conciliator of the Department of Labor as the third arbitrator. No decision has yet been rendered, but the arbitration is certain to cost the management, the union, and the government at least $500 in time and traveling expenses. The amount involved was 43 cents.

What Happens Under Seniority Rules

The original Sinclair agreement with the union contained a simple provision that the employer would follow the practice of promoting on the basis of length of service, provided the employee had the requisite ability to move into a higher job. In successive years this provision has grown into several pages of fine print which leave the employer practically no choice in making promotions. Seniority lists are everywhere available, and woe be unto the superintendent who moves up a man "out of line." When this is done because the man in line of seniority does not have ability, in the opinion of management, the decision is invariably questioned. Knowing this, superintendents have only a choice of evils—to promote an incapable man, or to have a row with the union.

The result is often the movement upward of undesirable employees and the holding back of the more ambitious and capable men. Why should men study, or, as they put it, "break their necks," when they can only move upward when someone dies or quits? There are valid arguments for promotion by seniority; it has been distorted into a very real liability for labor as well as management.

One of the union arguments for "strict seniority" is that without it promotions will be influenced by favoritism, of which there were undoubtedly too many instances in the past. The main reason why unions are so insistently in favor of rigid seniority is that it protects the average union brother. The ambitious man who wants to get ahead rapidly, often over the heads of his fellows, is frowned upon.

Over a period of years the employer in a seniority straitjacket, would find himself with a lot of old men who had laboriously climbed up from the ranks and had no greater ambition than to "get by" until retired. No new blood could be introduced into the organization except at the bottom of the ladder. The last man hired must be the first man fired in a layoff, even if he is the best man on the job. No decent employer wants to scrap old and faithful employees, nor would he do so even if no seniority rules existed. But employers would do well to examine the seniority clause with great care; otherwise they may find themselves in a situation where promotions in all standard operations must be made on length of service only; and with an argument on their hands every time an out-of-line promotion is made. Worst of all is the deadening hand of the seniority fetish on ambition and unusual capability.

Some of the liabilities of union relationships have been specifically indicated. There is an over-all aspect that is as important as it is difficult to describe in definite terms. Men who occupy positions from superintendents down to foremen have plenty to occupy their time. When constant and harassing meetings with workmen's committees bringing in armfuls of job grievances are added to their burdens, the result is demoralizing. The strong-minded supervisor will take the situation in his stride and make the best of it, resisting unreasonable demands and granting what is reasonable and right under the rules. In time, however, he is likely to lose his balance under the constant irritation. Then it is best to change the supervisor who deals with grievances.

Weaker men, of course, wear down more quickly, and are apt to take the easiest way—grant unreasonable demands for the sake of peace and let the employees get the upper hand. Nothing could be worse or more expensive.

Management Must Pick the Right Man

One cannot overlook the fact that under the same union agreement, one supervisor will maintain good working conditions and good relations with the employees, while another will be in hot water most of the time. There are two explanations: One is the difference in the personality and ability of supervisors; the other is the difference in the character of the local conditions. When these committees are dominated by unreasonable troublemakers, no one can get along with them. Management is at fault in not recognizing that under present conditions it takes a trained individual of uncommon abilities to handle labor relations. Because an engineer is a good plant or operations manager is no assurance that he will be a success in handling dealings with labor. In fact, the chances are that such an individual will not get along in a task that calls for great patience and human approach, and not too much logic.

The recent oil strikes accentuated the fact that the government lacks any legalized means for the settlement of labor disputes that threaten the very existence of the nation. That is why the Secretary of Labor was forced to the expedient of compulsory arbitration or something very closely resembling it. There are pending in Congress at least two measures seriously attempting to provide better means for settling serious labor disputes. One, the Hatch-Ball-Burton Bill, was the result of a great deal of study by presumably impartial experts. One of the authors of the bill was considered the best candidate that could be found for appointment to the Supreme Court of the United States. Promptly upon its publication, this bill was condemned by the heads of CIO and AFL, and many member unions of these organizations. If the Hatch Bill, or anything like it, is to become a law, there must be as much pressure for it as there is against it. Under the terms of the bill, an impartial fact-finding board would be appointed. For 30 days, while this board was investigating the controversy, a strike or lockout would be legally forbidden. The board would determine and make public the facts involved in a controversy, including findings as to the justification of wage increases. If either party refused agreement then the fact-finding board would become a judicial body and make awards enforceable in the federal courts. Whether or not this is the best approach to the problem of how to handle national labor disputes, it represents an earnest and informed effort. That something must be done to legalize the handling of strikes which menace the welfare of the country should be obvious to labor, to the public, and to Congress.

The Public Is Fed Up With the Union Mess

WHITING WILLIAMS

"WHAT DO YOU THINK of our present labor mess? How can we get out of it?" For a full week, this was the query that persons on all economic levels in a certain mid-Michigan city regularly put to me the moment I finished questioning them about a totally different matter. (It was a little later that strikers turned off the electric power in many Michigan cities, and still later that General Motors employees were called out.)

To every employer, nothing could be more significant than that this same question is today being asked from one end of the country to the other. For it is being asked by the only group powerful enough to give and enforce the answer—namely, Big Boss Public. This means that, after his recent years of fighting against almost hopeless odds, the industrialist can now take heart. For today Mr. Average Citizen does more than merely share the employer's long bewilderment and near-hopelessness. In addition, he is now full of fear for his own and his country's freedom and well-being. What he used to consider an inconvenient but more or less harmless series of industrial disputes has now become so widespread and so threatening as to look like nothing less than catastrophic civil war.

Innocent bystander though he is, can this average citizen be blamed?

To frequent battles between factory head and factory worker, he has been long accustomed. But recently "more than half" of the country's work stoppages have been caused, according to an officer of a regional labor board, by worker impatience with the federal boards' delays. Still more recently, many strikes have been called against, not the delays, but the boards' decisions regarding wages, bargaining units, independent unions, and such like. (Witness the recent demonstration-stoppage staged by the Telephone Workers

against the NLRB's suggested disestablishment of a Western Electric union as "company dominated.")

Since then, too, Mr. Bystander observes government officials—notably Secretary Wallace—assuring the country's workers that, contrary to all their previous experience, big wage increases need cause no real increase whatever in costs or prices. Since then, further, Boss Public (that's Mr. Innocent Bystander's real name) is forced to observe that his Government is completely powerless to limit the demands of Czar Petrillo or even to diminish in the least the "jurisdictional" battles now constantly waged in behalf of "union security" between Green's Federation, Murray's CIO, Lewis's Miners (including his District 50), the Railway Brotherhoods, Matt Smith's so-called Independents, the Federated Telephone Workers, and others too numerous to mention—to say nothing of all the numberless "wildcats" or the smaller but hardly less bitter internecine fights between the constituent members of these main aggregations.

As long as Government could be expected to protect him from too much injury from these various belligerents, Mr. (and Mrs.) Average Citizen, though troubled and bewildered, could at least be hopeful. But it is not surprising that hope is displaced by fear—also by irritation to the point of anger—now that he perceives that his Government is no longer a guardian umpire but, instead, a regular backer of one organized contestant against another and of both against all unorganized participants, and, worse still, against all unorganized observers.

What Caused This Labor Mess of Ours

Nevertheless, believe it or not, the chances of finding some way out of "our present labor mess" are vastly improved now that these observers have begun not only to share the employer's long bewilderment and hopelessness but also to get both mad and scared. For, when all is said and done, it is these Average Observers who tell their Government what it can and cannot do.

What will they tell it for getting us out of our present mess? Well, let's first see how we got into it.

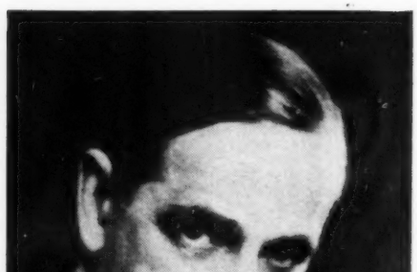
What caused our labor mess?

1. Without doubt, much of the present difficulty can be charged to the shortcomings of what used to be called *capital* and is now called *management*.

Who can be certain that NRA's and the Wagner Act's "representatives of their own choosing" would have been legislated—and one-sidedly administered—during the early thirties, if the management of the twenties could have kept on the road of employee understanding and cooperation which it began so enthusiastically to follow during and following the latter days of World War I? It is most unfortunate that this wave of interest in "personnel" and in employee representation could not have been maintained against that pressure for the elimination of every "needless expense" brought in the early twenties by the first of those two slumps which, according to economist Leonard Ayres, follow every war in the inevitable effort to get back to pre-war price levels.

Unquestionably, too many—by no means all—of those plans for closer contact and better relations with the wage earner represented only a skin-deep adoption of a new fad. Too often also the new personnel man, so far from being equipped to serve as an effective midwife to the new-born interest in the worker, was little more than a glorified employment agent—too likely to be a mere back-slapper, if not a "yes" man to his employer and a "con" man to his fellow-employees.

Close to tragedy it is that, as a whole, these new efforts to learn the employee's inner mind and heart, and so to win his confidence, did not succeed better than they did. Highly regrettable it is, also, that one reason for their failure may have been the post-war slump in union membership; too often this was taken to mean that all such friendly plans had again become a needless luxury, a costly frill. Important history would undoubtedly have been made if fewer employers had felt so certain that "If I could get rid of a dozen agitators, everybody would be happy here!"—if more managers could have taken to heart the testimony of my Welsh friend in the Rhondda mine: "If only the mawsters 'ere would think of oos leaders not so mooch as trooble-*makers* as trooble-*finders* and trooble-*reporters*, t'would be a better pit to work in 'ere the now!"



WHITING WILLIAMS

If anyone on the management side of the fence knows what's on the worker's mind, it's Whiting Williams. He has the common touch, acquired both by living and working among wage earners and by years of experience as a consultant in labor relations. *Factory* readers know him as a consulting editor who regularly contributes inspirational articles on labor problems.

To be sure, the good intentions of the employer who believed in paternalism or who, for other and better reasons, tried to play fair, were often made useless by the neighbor who insisted that "This is my business. I'll run it as I damn well please!" Also by such an employer as was once named to me in England as "the best friend we workers 'ave in the 'ole district 'ere—because 'e and 'is nawsty unfairness gives oos leaders all the talkin' points we need for convincin' everybody as 'ow they should 'ave the union's protection!"

But all the same it is easily conceivable that, if these new, war-born personnel activities had continued longer, they would have given more employers a better understanding of, for instance, the spiritual as well as the economic miseries and all-round demoralization of joblessness. This of itself would have persuaded them to keep in closer touch with the laid-off employee—to show more "concern" over his misfortune—than was general when 1929 brought the second and more painful of those inevitable post-war efforts to return to pre-war prices. Without doubt, it was this failure then, and more or less throughout the great depression, that helped to bring the pro-union legislation of '33 and '35, and also and more certainly, to give later to the CIO (especially its left-wing contingent) a barndoor opening.

2. But, regrettable as are the shortcomings of post-war management, it is questionable whether these would have contributed to the present mess without the help of the Depressed Thirties. As a matter of fact, these two causes operated together as a team. For it is hard to believe that the Wagner Act's astonishing one-sidedness would have been accepted if Boss Public had not, at the time, viewed such one-sidedness as, on the whole, a proper offset for the many years when Mr. Employer enjoyed laws equally one-sided in his favor. (I have always been amazed at the number of, for instance, college professors who

expected the Act to bring peace to industry even though they usually added: "Yes, it's quite unfair to management, but no more so than were the earlier laws unfair to labor." I've also been hardly less amazed at the number of those who regularly shrug off the shocking favoritism showed by the various labor boards with their "You couldn't expect to keep the Reds out of government agencies which had to staff themselves across the country so suddenly.")

It is most unfortunate that only today has Boss Public observed what should long ago have been crystal clear —that the evil of an unbalance in favor of the boss can't be righted by merely legislating and administering an equal unbalance in favor of the bossed. Nevertheless, this delay should not keep either employer or bystander from rejoicing that the footlessness of such juggling of unfairness is at last perceived.

3. Important as are these two causes, the present impasse would be unthinkable if in '33 the leaders of politics had not become convinced that, to remain permanently in Washington, they needed only to pay whatever price might be asked for organized labor's political support and partnership.

In explanation of this their conviction, the story is told that the President was deeply impressed when one day a political "expert" told him that his party would never have been swept out of power if President Wilson had been smart enough to win and hold the wage earners' millions of votes. There is, also, the well-authenticated story that, before the White House cast in its lot so definitely with unions, an officer of AFL was asked over to give his suggestions. Because, according to this officer, these suggestions favored cooperation with management, they were turned down and the more belligerent advice of a certain well-known leader was made the basis of the ensuing Labor Government's program which assumes that, in the eyes even of the Supreme Court, a labor leader can do no wrong.

The numberless sit-downs and other lawless disorders of the middle-thirties were by themselves powerful organizing tools. Nevertheless, their actual effectiveness would have been much less had not numberless organizers across the country felt free to assure every wage earner that "your President *wants* you to join"—and had not the President also felt it worth while to get on the telephone to urge certain captains of industry to forget their old-fashioned ideas about the rights of property and proceed to sign on the dotted line.

Enormously effective as were these demonstrations of the new Labor Government's actuality, they might have fallen short of their final achievements if only the wheels of industry could have been started turning. Unfortunately, the new alliance with labor leaders was accompanied by an elaborate aggregation of policies and practices all labeled as sure-fire economic restoratives, but all vastly less helpful to economic resuscitation than to the preservation of the political *status quo*. Among these the most famous was "elect and spend and elect." Others bore such names as "blame and tax-punish the opposition" and "subsidize the doubtful."

When all these new "remedies" failed to make a sick country well, they were followed by what is likely to be adjudged some day as the most serious, most deeply damaging policy of all. I mean the propaganda calculated to persuade all and sundry that, due to such evils as the greed of business and industry, the disappearance of our physical frontiers, and the malevolence of all labor-saving machines and other inventions, and further expectation of national prosperity was silly—that, henceforth, with all further growth and opportunity destroyed, nothing but a certain amount of "security" could be hoped for, and this—mind you—only at the hands not of selfish Business, but of "humanitarian" Government.

4. It was while we were in that philosophical as well as economic and political slough of despond that there came into operation, luckily or unluckily, another important cause of the present mess—namely, Hitler with his World War II.

It is hard to imagine how this new

Press Association photograph

Boss Public's present bewilderment, hopelessness, and fear (Whiting Williams speaking) do not represent its belief that collective bargaining and unions should be abolished . . . But it does mean that a people traditionally on the side of the underdog has become suddenly aware that the workers' leaders now threaten to become top-dog, as quick as any power-puffed potentate to forget the interests of others

cult of wealth *distribution* via politics and government could ever have permitted any return to our traditional American belief in the *creation* of wealth via industry if the painter Schickelgruber had not come upon the scene. As it was, the war crisis permitted and demanded the further extension and multiplication of the Government's depression-born controls and restrictions, all now too numerous and too well known to mention.

It also gave to the labor boards responsibility for determining "Which union?" and "What wages?" It further brought into operation such new devices and developments as maintenance of membership in exchange for the no-strike pledge, the military occupation of private shipyards and factories, along with the war-raised living-costs and take-home pay checks which called for the Little Steel formula, and, later, the current ultimatum of "52 for 40 or fight" (without price increase). Besides permitting, in the interest of national unity, every variety of small "fringe" or "nibbling" gains for accumulating a very considerable total, the same crisis brought the CIO's highly disturbing reach for political power in the shape of its PAC.

On the other hand, it is to be noted that this same war crisis which thus vastly enlarged the powers of the leaders of government and of labor—with both appearing equally anxious to battle for "union security"—also served to make the country proud of its victory-winning miracle of production, and hence again aware of the vital importance of enlarging the pie of our national wealth instead of merely promising a larger piece to certain voter groups. Hitler's war and its backlash of reconversion can thus be said to have greatly lessened the bitterness of the domestic war waged here among us ever since 1933 between the leaders of government and labor on the one side and, on the other, the leaders of business and industry.

In fact, this combination of war and re-conversion (beg pardon—I mean *re-conversion*) can be said to have changed that domestic battle into the present Civil War in which the business man and industrialist appear now to have been virtually relegated to the sidelines.

What could be more significant than that today Big Boss Public now fastens on many union heads exactly the same titles it used to reserve for Wall Streeters and employers—such as, "vested interests," "princes of privilege," "greedy monopolists," "members of the old public-be-damned school"?

Boss Public's present bewilderment, hopelessness, and fear do not represent its belief that collective bargaining and unions should be abolished. Though deeply disappointing, these have nevertheless demonstrated their potential usefulness to modern industry and modern living. Nor does it mean that Boss Public would deny labor leaders their right to take active part in politics if they think this wise. But it does mean that a people traditionally on the side of the underdog has become suddenly aware that the workers' leaders now threaten to become top-dog, as quick as any power-puffed potentate to forget the interests of others. It also means that, to make such potentates aware of the rights of others, Boss Public now wants to establish certain restrictions.

Why the Washington Conference Failed

LEE H. HILL

THE MOST TANGIBLE RESULT of the National Labor-Management Conference is that it must have demonstrated to the federal government under circumstances too solemn to be laughed off that the leaders of the union labor movement in America will not voluntarily accept any fair and practical program to reestablish and preserve labor-management peace.

It is possible that President Truman and Secretary Schwellenbach will not state publicly or even privately how evident the conference made it to them that no reasonable settlement would be accepted by the union leaders. But it is completely impossible that this fact could have escaped the President and the Secretary—who had fathered the conference in the hope it would develop its own program to heal the major conflicts of present-day labor-management relations.

No matter how sympathetic the Administration may have felt toward the memberships of union organizations, and no matter how ready it might have been to have beaten the drums in support of some top-heavy compromise in favor of labor, there was no escaping the evidence in the conference that the top men of unionism are unswervingly committed to programs of their own which in many parts are hopelessly unfair, preposterous, and unworkable.

Some of the Reasons for the Failure

In the first place the union leaders at the conference flatly refused to give up the use of strikes except under conditions which leave them loopholes. But what chiefly defeated the main purpose of the conference was that the union delegates refused to accept some of the most essential provisions, submitted by management, for peaceful settlement of strike causes.

For example, take the union group's attitude toward jurisdictional strikes. Without the slightest evidence of embarrassment, the union delegates frankly admitted the numerous instances in which whole plants have been forced to shut down, throwing thousands of employees out of work, simply because a handful of union workers were engaged in a jurisdictional dispute. But at the same time that the very existence of such strikes provided proof enough that any present machinery to prevent them is ineffective, the union delegates insisted that present procedures within "parent organizations" are the only procedures they want. Under questioning, however, they admitted that no inter-union procedures now exist; and representatives of both AFL and CIO refused to consider providing any machinery for settling jurisdictional disputes involving independent unions.

When management delegates then recommended that, if proposed methods for no-strike settlements by the unions of jurisdictional disputes could not be accepted by the leaders of the unions, legislation should be adopted to provide alternative procedures, the labor delegates retorted that union labor is opposed to any legislation that would invoke the police power of the government in settlement of this or any other kind of dispute.

The same desire of the union leaders to keep their organizations "untouchable" in any way that police power may

LEE H. HILL

An alternate delegate for management at the President's Labor-Management Conference, Hill writes at first hand—and out of a distinguished background in labor relations—of the failure of that meeting. With Charles Hook, Jr., he is co-author of "Management at the Bargaining Table." A former vice-president of Allis-Chalmers Manufacturing Company, in charge of industrial relations, he is now publisher of McGraw-Hill's *Electrical World* and *Electrical Contracting*.

be used to protect the natural rights of others, was consistently shown also at other points of the conference. When management attempted to win union acceptance of the clause that "there should be full regard for the protection of individuals and property against unlawful acts"—a tenet that stems all the way back to the Ten Commandments—the union delegates refused to include any reference to the use of police power for the protection of individual and property rights involved in a union attack.

Some progress was made toward a basis of labor-management peace through adoption of a number of technical proposals. But even many of these were accepted only by the inclusion of ambiguous phrases that serve as easy openings for escape. Typical in this category was the union leaders' acceptance of a statement that they would *defer* striking while a contract or a dispute was being negotiated—provided that the negotiations were being conducted "in good faith." Plainly that proviso leaves it within the power of a union official to brand any negotiation as *not* "in good faith" at any time that a negative description suits him.

The generally adamant attitude of the union representatives was further shown by their fixed opposition to any suggestion for improvement of labor relations that might need to take the form of a revision of the Wagner Act. For instance, management called attention to the frequency of strikes connected with the initial determination of a bargaining agency, and to the frequency of strikes during the negotiation of contract proposals. To cure such troubles management proposed that any interference at such times by either management or labor, including strikes, should be legally defined as unfair practices and be dealt with accordingly.

But the union delegates not only rejected that suggestion; they turned a heated attack on management for even making it. Of special significance in this rejection was the fact that the union leaders' first point, as they officially stated it, was simply on the grounds that "management's report is a clear proposal to amend the National Labor Relations Act"—as though merely the fact that it was offered as an amendment was sufficient to make it sure to meet a fixed position of hostility.

Placed significantly in second position, but accompanied by an attack on management in soap-box phraseology, the union leaders' statement added: "Under the law (NLRA) it is spe-

John L. Lewis addresses the President's Labor-Management Conference

Says Hill: There was no escaping the evidence that the top men in unionism are unswervingly committed to programs of their own, which in many parts are hopelessly unfair, preposterous, and unworkable

cifically stated that nothing therein shall be construed in any way to impede or interfere with outstanding rights of labor to strike or take other concerted action or mutual aid. Management proposes to repeal that provision. The result thus sought by management is to impose industrial slavery on American workers."

Likewise, regarding disputes between rival unions as to which should represent certain employees in collective bargaining, the union delegates contended that full acceptance by all parties of the machinery provided in NLRA "will resolve these disputes." Emphasizing their "no-deviation-from-NLRA" policy, they added: "Management's proposals are based on a desire to discard a major portion of this machinery and to substitute therefor machinery which must of necessity require amendment of the national labor act. There is no need for amendment of the National Labor Relations Act, and labor cannot agree thereto."

Management Functions Not Recognized

Another major point of disagreement concerned management's efforts to persuade the unions to specify certain natural and exclusive functions of management which should be kept immune from union meddling. Included among the functions which management said are not appropriate for collective bargaining are: The determination of products to be manufactured or services to be rendered to customers; the location of the business; layout, equipment, processes, techniques, methods and means of manufacture and distribution; design of the management structure and selection of its membership; determination of the job content (basic volume of output) of the work force; allocation and assignment of work to the workers; scheduling of operations including time and number of shifts.

But the union representatives not only refused to agree to stay out of the whole group of management functions; they further refused to accept even one of the functions as an exclusive field for management. In other words, the refusal indicated that the labor leaders desired to leave the avenue open for continuing attempts to squeeze management out of any or all of its normal functions at any time that union leaders may feel strong enough to do it.

One excuse offered for opposition to recognition that certain management functions are rightfully exclusive was that some unions already have succeeded in getting control or joint control of some management functions, and therefore any acceptance on behalf of unionism in general of the exclusive premise might tend to deprive some unions of what they had already gained.

Further on this point the union leaders' formal statement said:

"It would be extremely unwise to build a fence around the rights and responsibilities of management on the one hand and the unions on the other. The experience of many years shows that with the growth of mutual understanding the responsibilities of one of the parties today may well become the *joint responsibility of both parties tomorrow.*"

Under the subject of collective bargaining came another evidence of union leadership's high-handed attitude when the union delegates, in effect, held that in collective bargaining over a union demand *management never has the right to give "No" for an answer!* For each proposal made by a union, the delegates said in their official report, "genuine collective bargaining requires a counter-proposal of some kind, and not a denial."

The union delegates also refused to accept a management proposal of specific procedure for giving notice of a decision to strike and for setting up a method of impartial fact-finding before a strike could be legal.

The general form for the notice of strike provision as requested by management was: "If the dispute is not settled by collective bargaining, conciliation, or voluntary arbitration, it should be the obligation of the parties to give the governor of the state in which the dispute is pending 10 days' notice before any strike or lockout."

Management's Proposal for Fact-Finding Panels

For provision of a specific system of fact-finding, the management delegates covered the wording as follows:

"In cases where, in the opinion of the governor, a strike or lockout would constitute a public emergency or endanger the health or safety of the public, the governor should be empowered to arrange for the appointment of a fact-finding panel. Such a panel should be nominated, upon request of the governor, by the chief judicial officer of the state, and should consist of outstanding citizens who do not reflect either employer or employee interests.

"In cases where a national emergency is involved, or national health or safety is endangered, the President of the United States, upon his own motion, should be empowered to appoint a similar panel.

"Such a panel in either of the above cases should hear both sides *through their own witnesses* and within 30 days make public the facts concerning it, without recommendation. Upon the appointment of such a panel, and for not less than 10 days following publication of the facts as found by it, the parties should be obligated to maintain the *status quo* unless a settlement is arrived at in the meantime."

Agreements Reached by the Delegates

All of the notice and fact-finding set-up was rejected by the union delegates, but on some other points related to collective bargaining the conference arrived at common agreement. Included in the latter group were the following statements:

"Both parties should avoid threats or actions which interfere with normal operations while negotiations are still proceeding in good faith, and until all other peaceful procedures have been exhausted.

"Conciliation should be employed by the parties if collective bargaining has not resulted in agreement. Such conciliation may be private or public, local, state, or federal, as best suited to the circumstances."

Concerning conciliation service, the agreements included:

"As far as possible, and wherever practicable, disputes should be settled at the plant (local) level.

"Every effort (should) be made toward the reorganization of the United States Conciliation Service to the end that it be established as an effective and completely impartial agency within the Department of Labor.

"Provisions should be made for practical training for newly appointed conciliators.

"Conciliation must, under all conditions, be maintained as distinct and separate from arbitration.

"The division of arbitration of the United States Conciliation Service should be reorganized.

"A complete list of arbitrators, with a summary statement of experience and qualifications of each, should at all times be available to labor and management representatives.

"The scope of the arbitration and the method of enforcement of the decision shall be determined by the terms of the contract being arbitrated or by agreement of the parties."

If success of the conference is measured by the extent of agreement, it must be said that little was accomplished of a tangible nature. However, the fact that the conference was held will undoubtedly have considerable effect on the country's future labor relations policy. The very fact that in a conference of such national import no

Strikers bar entrance to Yale & Towne's president (at lower left, with police officer)

When management attempted to win acceptance of the clause that "there should be full regard for the protection of individuals and property against unlawful acts," the union delegates refused to include any reference to use of police power for the protection rights involved in a union attack

voluntary over-all agreement could be reached indicates clearly that legislation is required to force union acceptance of responsibility and of equality.

Perhaps the greatest accomplishment of the conference was in getting many of the labor-management problems down to fundamental issues and then obliging union labor's leaders to state their position on them—thereby creating a favorable opportunity, as future developments may occur, to expose their fallacies, and keep those same leaders from "worming out" with the pretext that they were "speaking carelessly on an unimportant occasion."

Rivaling the nailing down of the union delegates' positions on fundamental issues as possibly the greatest accomplishment of the conference was the development of a newly improved platform of agreement among 36 principal and alternate delegates from management. (See "Management's Program for Labor Relations," page 250.)

These men met daily for almost five weeks, and although they represented very diversified viewpoints—coming from large, medium, and small companies, of a wide variety of enterprise, and from geographically far-flung institutions—they succeeded in unanimously developing a management program which, if it can be made effective by appropriate legislation, will definitely minimize future labor disputes.

Key fact of this program is that it provides for management and labor *equality under the law*. It would recognize as unfair practices certain procedures of unions which are now held unfair for management but fair for unions, and *vice versa*.

Under the management program, disputes over union recognition would be settled peacefully. A union once certified would be protected from raids from other unions for the life of the contract. A definite and complete procedure for handling jurisdictional matters and disputes is outlined. Management functions and rights are clearly defined.

The same program includes many items which the labor delegates accepted, but it also includes numerous details which, although plainly fair and logical, were rejected by the labor delegates and hardly considered by them.

Although not adopted by the conference as a whole, and rejected by the union delegates in vital parts, this management program should be highly useful in a number of ways:

1. It goes far to crystallize certain management viewpoints that were previously nebulous or inadequately defined, and it has gone far to provide a platform on which management, often divided within itself heretofore, can now find a much larger basis for its own unity.

2. Thus it can serve management as a valuable supplementary guide in future negotiations or conferences with union labor.

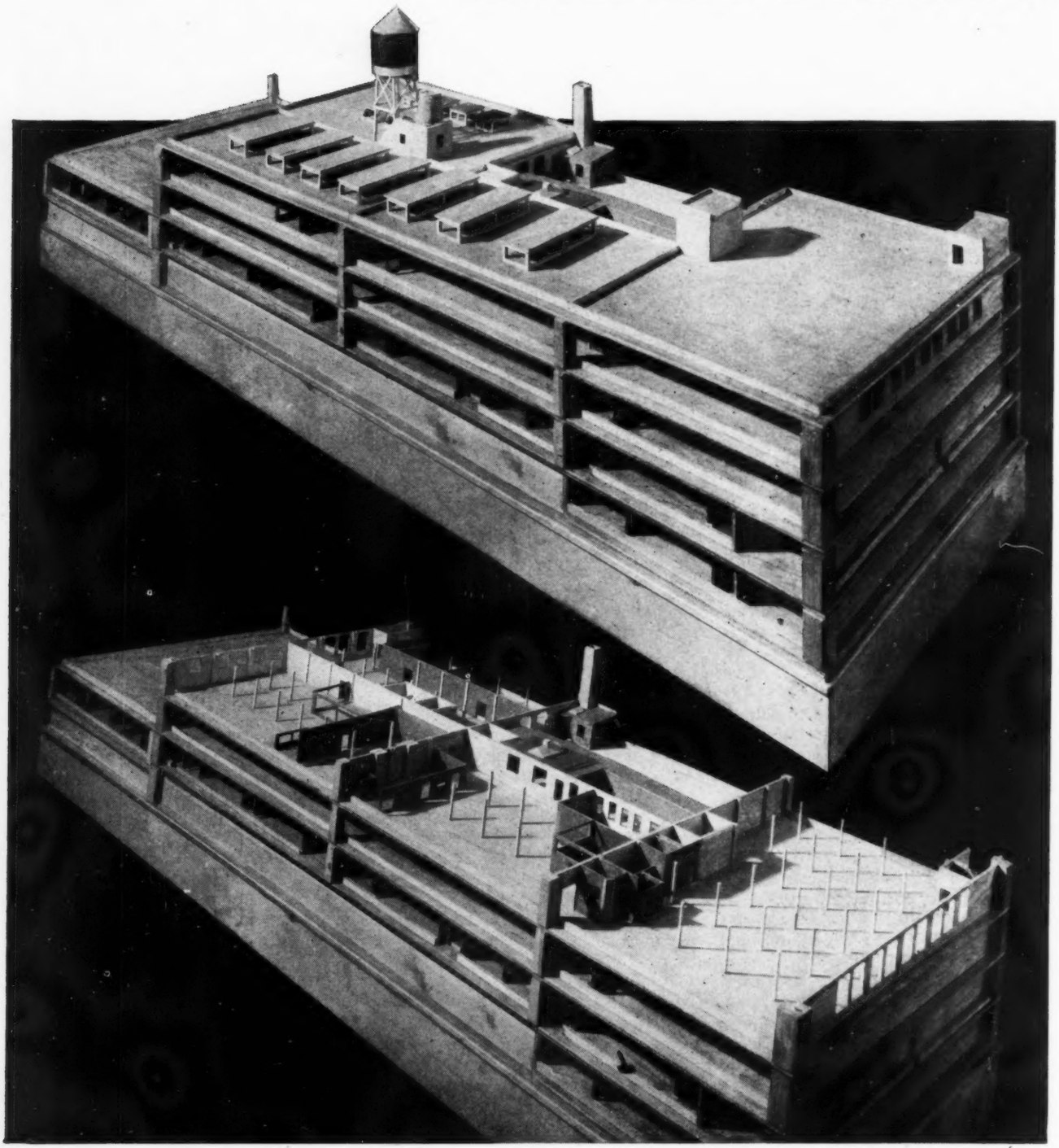
3. It should point out clearly to members of Congress a carefully considered, logical, and practical program for minimizing labor disputes.

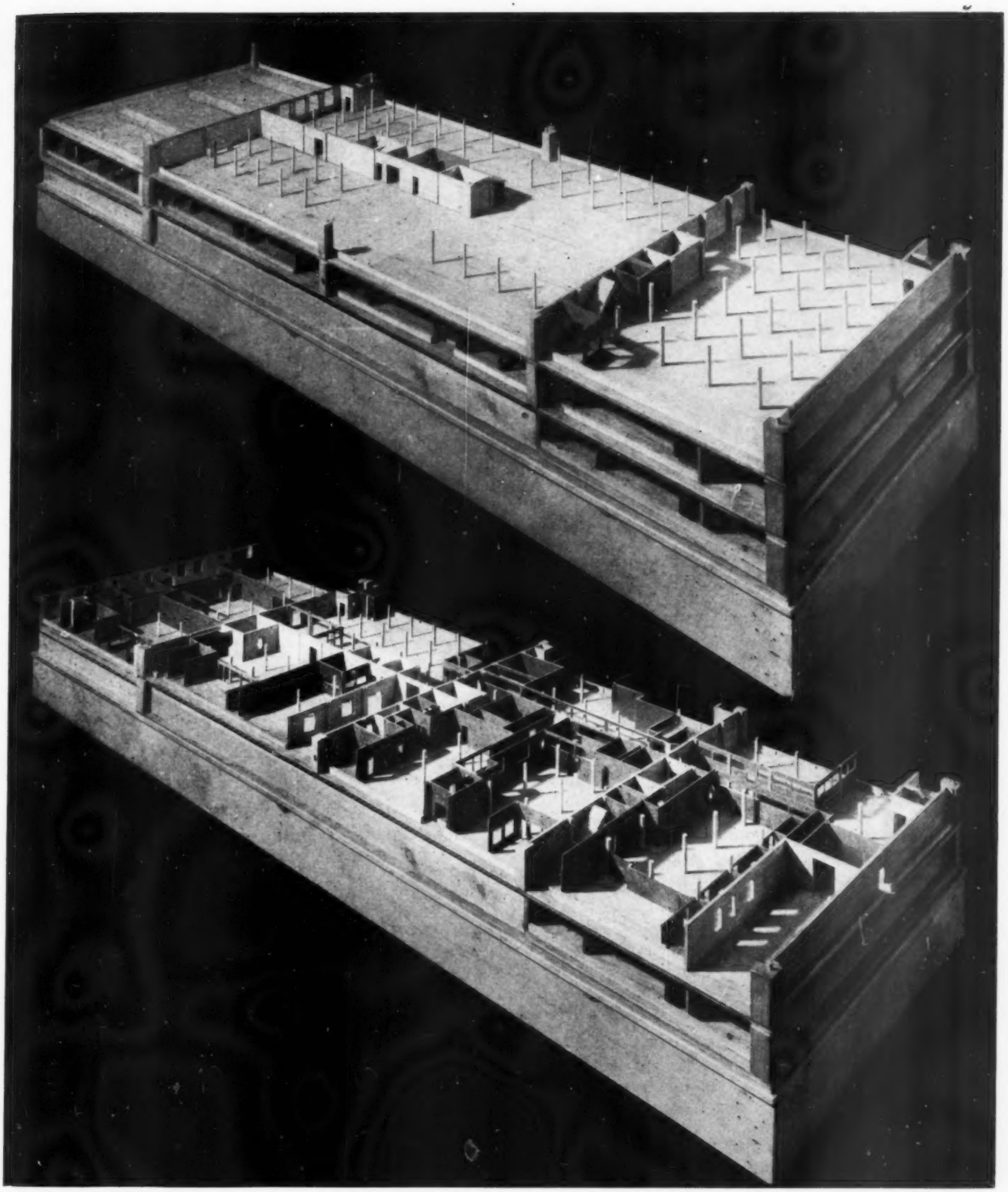
If properly implemented by appropriate legislation, this program should go a long way toward solving the country's No. 1 problem.

Thus the two main accomplishments of the conference show that, despite its main failures, important and desirable after-effects may have been stimulated for the future.

Building Model Lessens Chance for Layout Mistakes

Reconversion at The Dole Valve Company, Chicago, has been expedited through use of scale model. It helps methods men to visualize layout problems





Going considerably further than the usual three-dimensional layout, The Dole Valve Company, Chicago, manufacturer of brass products, has constructed a scale model of its three-story plant. The purpose of this model (⅛ inch = 1 foot) is to lay out the entire facilities for reconversion. It further serves the purpose of actually placing machines, benches, etc., in line so that all concerned can get a clear picture of the proposed changes. The model is built of pine, plywood, and pressed wood, with assembly floors and partitions. Walls and machinery locations are doweled and placed so that they can be readily moved. Shown from top to bottom, and left to right, are model complete, model with roof removed, model with roof and third story removed, model with roof and second story removed

Free Flow, High Production With Mechanized Hauling

HENRY B. MYERS, Vice-President and General Manager, The Ferro Machine & Foundry Company, Cleveland

MECHANIZED HANDLING of literally almost everything that needs to be moved for producing castings in the Cleveland iron foundry of The Ferro Machine & Foundry Company has been by far the biggest single factor in obtaining high production at a fraction of the former costs.

Principally it has revolutionized all production methods by transforming the process from a batch-lot basis to continuous-line production. No more striking example of the effectiveness of mechanized handling in this plant can be given than the single fact that on an equal space basis, it is responsible for at least a fourfold increase in the output of castings.

But there are other advantages, too, that in themselves have justified the investment of materials handling equipment throughout the plant. From an employee viewpoint, the traditional dirt and dust have been replaced by comparative cleanliness. The heavy sweat and toil formerly associated with a foundry are now the exception instead of the rule. Elimination of most of the heavy manual work has meant less worker fatigue. The plant's safety record is better than that of some metal-working industries. All of these improvements have made for more attractive working conditions, hence an ability to select and place employees properly.

From a product viewpoint, improvement in the various qualities that make a good casting has been a direct result of mechanized handling of the major operations that precede and attend the actual production of the iron castings. Better molds, for instance, are assured by the control of the quality of molding sand, which is made possible by continual conveyorization of perfect sand to all molding stations, and by the similar return of all spent sand to a reconditioning machine before re-use. Cores that are being delivered by conveyors to the molding stations are of consistent quality because of the more careful handling they get in manufacture and transport.

Nor can the contribution that mechanized cupola operations are making toward quality of product be ignored. Finally, the texture of the casting has been improved through the control afforded over all its movements by planned mechanized handling from the moment the molten iron is poured into the mold until the casting leaves the shipping door.

Old Methods Spasmodic

For an over-all appreciation, however, of what mechanized handling has done at Ferro, no better picture can be drawn than a review of some of the conditions existing before its adoption. The product of manufacture then was, and still is, cast-iron automotive parts for gasoline and diesel engines, such as cylinder heads and blocks, manifolds, crankcases, and flywheel housings, ranging in weight from 4 to 200 pounds.

In the old days, molds were made in the morning on the casting floor and

Mechanized handling right at the start of foundry production operations makes jobs easier and multiplies worker efficiency. Here, gravity roller conveyor returns empty flasks, after use, to molders' benches. Note use of overhead pneumatic hoists to lift

←

lined up ready for pouring at the same location. Molding sand was worked up right on the floor, "cut" by hand, and shoveled into flasks. Production was severely limited by the floor space.

Pouring occurred only once a day, for several hours in the afternoon. That night, after a pause of several hours for cooling, the molds were shaken out right on the floor. The dirt, dust, smoke, and heat were extremely unpleasant. Hot smoking castings, still partially covered with sand, were piled on low flat trucks, with the help of overhead hoists, and the trucks were then dragged into the yard outside the cleaning room for further cooling. Sand dropping from the castings in transport was spread all over, and became contaminated beyond recovery.

Next morning these casting, still smoking, were taken from the yard into the cleaning room for cleaning, chipping, grinding, and inspection operations. Frequently they were still too hot to handle because of the insulated coating of sand adhering to them. This same coating often caused uneven cooling, with resultant undesirable stresses and strains set up in the casting. Also, the castings in the center of a truck pile cooled unevenly, showing differences upwards of 40 Brinell hardness on various parts of the same casting. Molding sand that gradually accumulated on the cleaning floor had to be periodically removed. It could not be salvaged.

Laborious Handling

Castings were moved about the cleaning room mostly on two-wheeled hand trucks, in loads averaging 200 pounds each. Altogether too frequently a casting would drop off a truck and need picking up. Sometimes a part of the dropped casting would break off in the fall. Breakage losses were a recognized factor in computing production costs.

In the casting room, after the castings were knocked out of molds and taken away, the floor had to be straightened out every night in preparation for the next day's work. Copes, drags, and clamps had to be piled in order, and sand cleared from the floor into piles for reworking and re-use. In every 24 hours the casting floor followed a "reconversion" cycle that was costly in time and effort required to move materials and tools on and off the floor. Similar interruptions naturally existed in the movement of materials of all other departments that flowed into and out from the casting room.

Contrast this picture of intense physical effort and intermittent production with the highlights of present-day mechanized operations at Ferro. So far as actual production of castings is concerned, there are four main departments involved, all of which are operating on a continuous production-line basis. These are the cupola room, casting room, cleaning room, and shipping room. Each of these departments is situated in a separate building, except the core room, which is located on part of the ground floor and also on a second floor, immediately overhead, in the building housing the casting room.

In general, there is a continuous flow of raw materials from the cupola room and core room into the production lines of the casting room, and a similar flow of iron castings from these lines into the cleaning and shipping rooms.

Seven Conveyor Lines

Production actually begins in the casting room. Here there are seven conveyorized production lines, each similarly equipped for mechanized handling of its major operations. In one of these typical, somewhat elliptical-shaped production lines an endless car-type "carrousel" conveyor of an average periphery of about 400 feet handles all operations from molding to shakeout. Pouring is continuous at one point in this line, and castings are turned out at the shakeout station all day long in continuous process.

Molding sand needed for each production line is prepared by special machinery at a centralized location off the casting floor. It is brought by overhead belt conveyors to gravity hoppers that feed the molding machines in each line. Cores are delivered to the production line by overhead chain conveyors leading from core room direct to that point in the line where they are needed.

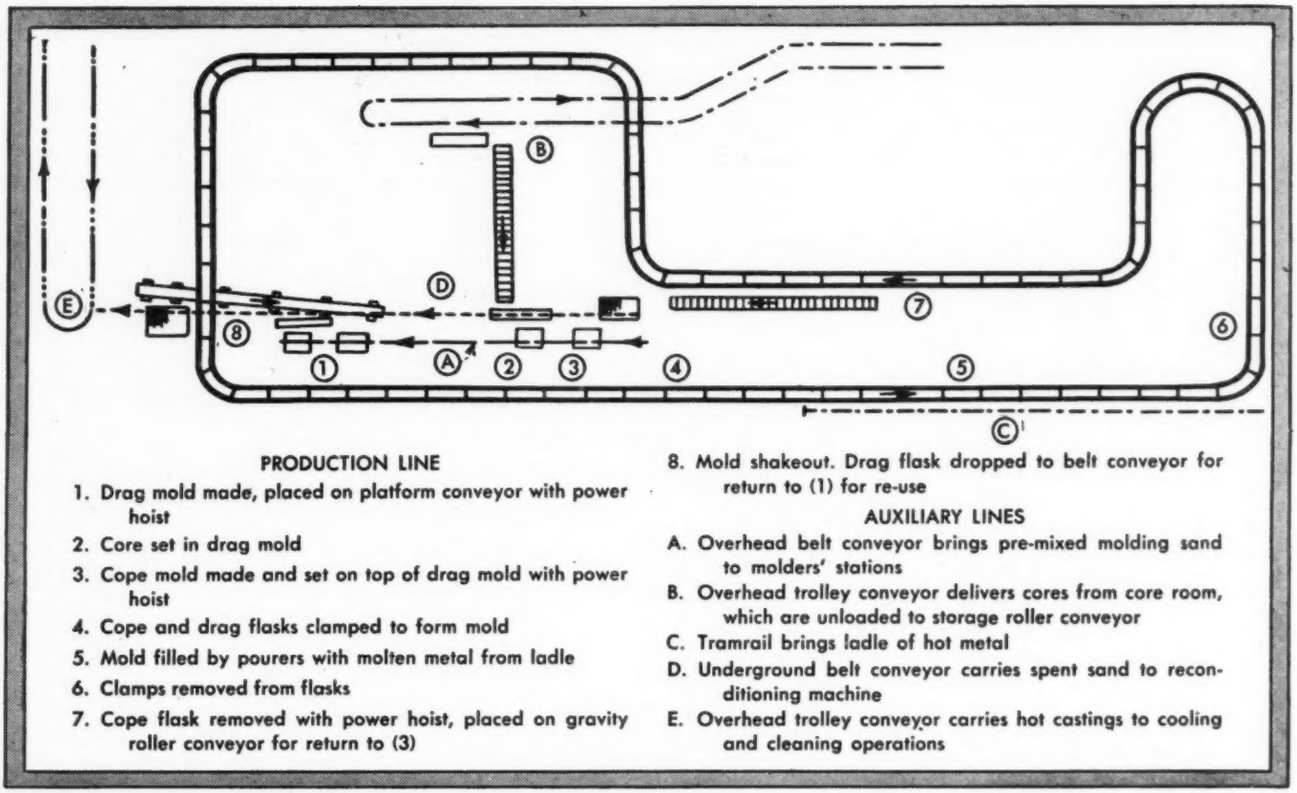
Cooling Expedited

After the molds are poured, they continue on the platform conveyor under ventilated hoods, and ultimately arrive at the shakeout with copes already removed to expedite cooling and to draw off most of the smoke by forced enclosed ventilation. The shakeout operation likewise is hooded and provided with forced ventilation, to remove offensive dust. Sand shaken from the castings drops through grates to a conveyor belt below and is returned through subterranean routes to a reconditioning unit for recirculation to molding machines.

From the shakeout the castings, still cherry hot, are transferred manually by use of power hoists, to a continuous overhead trolley conveyor, which delivers them 4 to 5 hours later, evenly cooled and reasonably free from sand, to the cleaning room.

Cooled castings are removed from the cooling conveyor when they arrive at a

In the foreground, cores are stored on gravity roller conveyor that feeds production line. In the rear, overhead chain conveyor delivers assembled cores on double-decked tray carriers, without breakage, from the core room which is several hundred feet away



PRODUCTION LINE

1. Drag mold made, placed on platform conveyor with power hoist
2. Core set in drag mold
3. Cope mold made and set on top of drag mold with power hoist
4. Cope and drag flasks clamped to form mold
5. Mold filled by pourers with molten metal from ladle
6. Clamps removed from flasks
7. Cope flask removed with power hoist, placed on gravity roller conveyor for return to (3)
8. Mold shakeout. Drag flask dropped to belt conveyor for return to (1) for re-use

AUXILIARY LINES

A. Overhead belt conveyor brings pre-mixed molding sand to molders' stations
B. Overhead trolley conveyor delivers cores from core room, which are unloaded to storage roller conveyor
C. Tramrail brings ladle of hot metal
D. Underground belt conveyor carries spent sand to reconditioning machine
E. Overhead trolley conveyor carries hot castings to cooling and cleaning operations

Figure 1. Layout of one of the casting-room production lines, typical of all seven

final knockout station in the cleaning room. From the knockout operation they are transferred to another overhead trolley conveyor line which carries them successively to the various operations on the cleaning floor, such as shotblasting, chipping, grinding, testing, and inspection. During all these cleaning operations there is no offensive smoke or dust from the castings as they are conveyed about the cleaning room, and no dropping of dirty molding sand on the floors. What is more, every piece that leaves the casting room gets to the cleaning room intact and ready to work on.

Cleaning to Shipping

All castings on the cleaning conveyor do not require the same processing, and some are ready for shipment before they have traveled half the route. A third overhead trolley conveyor line is provided to carry all finished castings from cleaning floor to the shipping room. This line runs parallel to the cleaning conveyor at various transfer points to receive finished castings, and delivers them in a continuous flow to the shipping department. Here the castings are sorted, placed on pallets, and moved in unit loads by a fork lift truck into motor trucks or freight cars for delivery to the customer. It is not unusual for pallet loads of castings from Ferro to be found on the customer's machining floor within 48 hours after pouring. Mechanized handling alone has made this steady flow possible.

The transition from the old "piece" method of handling, however, to the present continuous process was not a quick one. Some 25 years ago a single roller conveyor was tried out somewhere in the casting room, but it was a failure. The exact reason is unimportant, but apparently the vision of the potentialities of conveyorization stuck. Within the next five years the use of car-type conveyors became the standard procedure on Ferro molding lines. Further gradual improvements were made, and today the seven car-type conveyor lines as found in the casting room form the nucleus upon which the more recent conveyorization projects have depended for their successful performance.

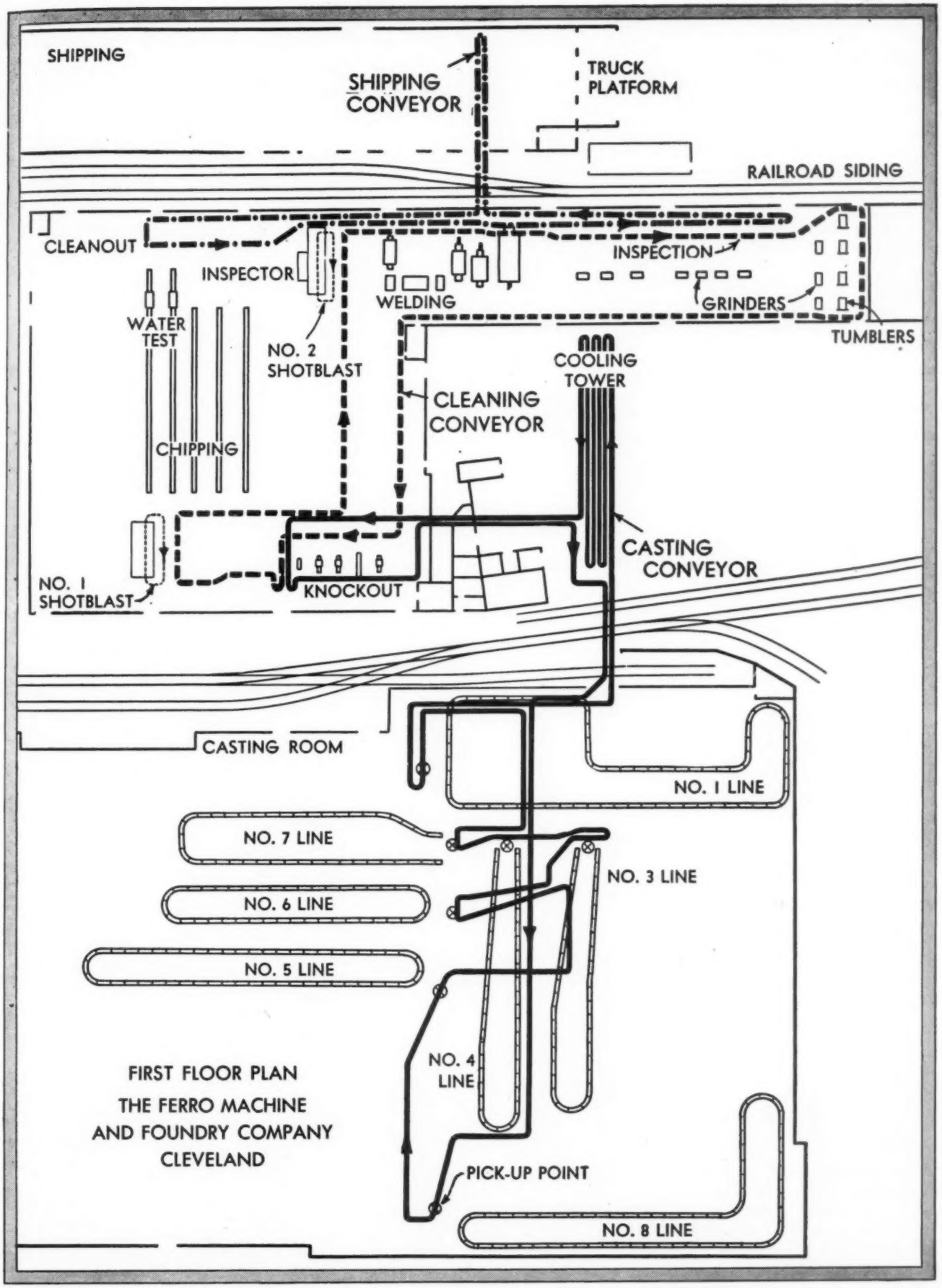
The layout of one of the casting-room production lines, which is typical of all seven, and the detailed operations taking place from molding to shakeout, are shown in Figure 1. All men working on the line remain within the small sphere of their activity. Molders always have a supply of cope and drag flasks at their elbow, at working level. Molding sand of proper consistency is chuted into the flasks from an overhead hopper supplied by an overhead belt conveyor. Cores are delivered on tray carriers to the production line by an overhead chain conveyor, and are unloaded and stored on a gravity roller conveyor ready for use.

At the point where the molds are ready for pouring, the ladle is brought from the cupola to the pourers by a man-operated cab-car riding on a tramrail, and ladle is held in position for tilting the metal into the slowly moving molds. The car-type conveyor travels at a speed of about 10 feet per minute, and makes a complete cycle in 30 to 45 minutes, depending upon the length and speed of the line. Lineal speed can be varied to meet production needs.

At the point in the line where cope flasks are removed, by use of an overhead power hoist, a gravity roller conveyor is employed to return the cope flask to the molder's station. Likewise, at the shakeout station the drag flask is returned to working level at the molder's station by an uphill belt conveyor that picks up the flask at floor level where it has been dropped from the shakeout.

There is no tugging, hard pushing, or continuous heavy lifting at any point

Figure 2. Three conveyors—cooling, cleaning, and shipping—complete the mechanized handling of the product through all stages



FIRST FLOOR PLAN
THE FERRO MACHINE AND FOUNDRY COMPANY
CLEVELAND

Hot castings from hooded shakeout stations are transferred to continuous overhead trolley conveyor, for delivery to cleaning room, using power hoists suspended from monorails. Empty flasks are swung onto adjacent uphill belt conveyor for return to molders' stations

along this production line. The application of mechanized handling principles has not only eliminated the backache, but also has removed most of the sweat and discomfort from heat and fumes. More than that, it has made possible a continuous production of 4 to 5 tons of castings per hour by each production line.

Few details can be given regarding the auxiliary lines that bring the raw materials of molten iron, molding sand, and cores to the seven production lines in the casting rooms, without inviting a burdensome description of their process applications. No imagination is needed, however, to see the value of mechanized handling in those departments, and to recognize its important relationship to obtaining a continuous flow of the product from the production lines.

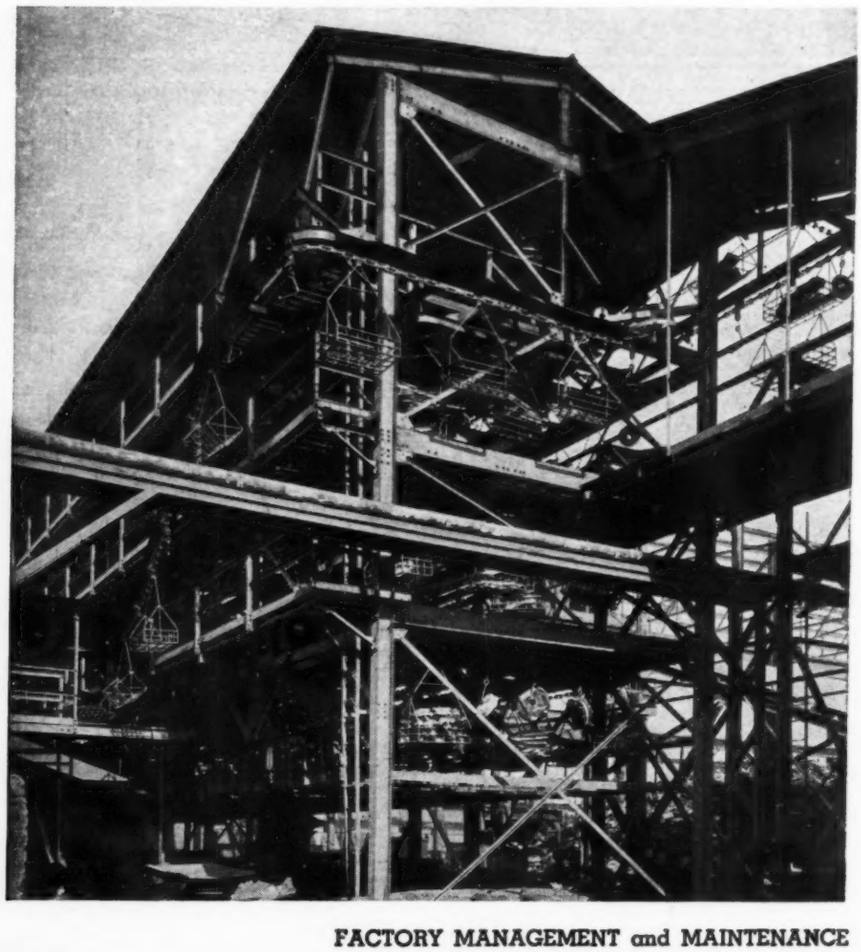
An Integrated System

Anyone standing on the center of the casting room floor is sure to get an impression of vast movement of materials by conveyorization all about him. Each of the seven production lines, which are scattered over the floor, requires services similar to those just described for the one line. The result outwardly looks like a hodgepodge of overhead trolley conveyor lines that crisscross high over tramrail lines and under belt conveyors, and occasionally dip down toward the floor where production lines are located. The picture at first doesn't seem to make much sense, but after some study it is seen to represent an integrated system that really has worked to multiply output several times over, not to mention the attainment of considerably better working conditions.

But it was not until the recent installation of the three conveyor lines for routing the product from the seven production lines on the casting floor to the shipping room that the full benefits of mechanized handling were realized. Known as Nos. 1 (cooling), 2 (cleaning), and 3 (shipping) conveyors, these lines successively carry the product through the remainder of the foundry processes and have thereby completed the mechanized handling of the product through all stages of manufacture. Their layout is shown in Figure 2.

All three conveyors are of the endless overhead trolley type, and travel at the same lineal speed of about 12 feet per minute. Primarily this speed was determined by the work load of No. 1 cooling conveyor.

The total length of No. 1 conveyor is 4620 feet. Its trolleys ride on 6-in. monorail, spaced on 3-ft. centers, from which are suspended either large baskets or single hooks to carry the hot castings. There are 1540 carriers. All carriers for this and the other two conveyors were made of ¾-in. rod by the plant maintenance department, using welded construction. Baskets were designed to hold four to eight light cast-



After receiving hot castings from production lines, cooling conveyor zigzags almost 3000 feet for 4 hours through steel tower, which cools castings to handling temperatures on arrival in cleaning room

ings, for a total dead weight of about 200 pounds. Hooks were designed with safety lip for single large castings, such as cylinder blocks, that could be safely suspended through core holes.

Observe from the layout in Figure 2 how a casting from any production line on the casting floor starts on its way toward the shipping floor. Beginning at a point just opposite the shakeout station at No. 8 production line (there is no No. 2), No. 1 conveyor proceeds to the shakeout stations of the other six production lines in order of Nos. 5, 6, 3, 4, 7, and 1 consecutively. For the most of this route the conveyor rides at overhead levels, and comes down to working levels only at the shakeout stations for horizontal distances of 12 feet for Nos. 8, 6, 3, 4, and 7 production lines, 18 feet for No. 5 line, and 24 feet for No. 1 line. This gives from 1 to 2 minutes' loading time to transfer casting from shakeout to the conveyor at these points. Loading is done by use of hand-manipulated hooks and chains on power hoists which swing on booms or ride on monorails for the short distances between shakeout platforms and conveyor. At these transfer points the conveyor monorail is located about 7 feet above the ground level, so that carriers or hooks are at working level.

Laid Out With Strings

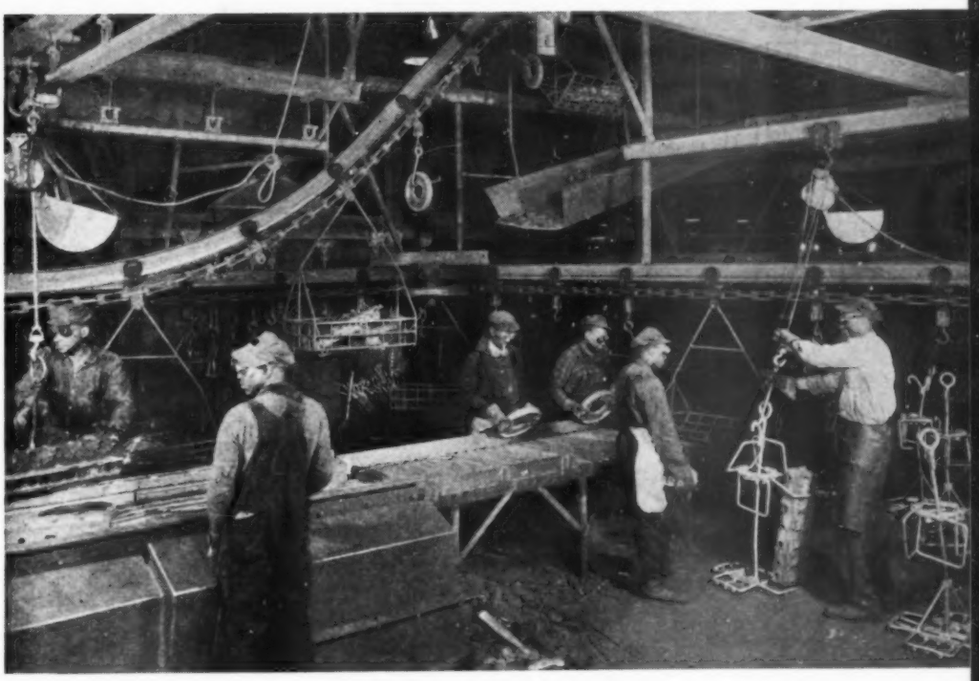
The design and erection of No. 1 conveyor was complicated by the complex pattern of mechanized handling equipment already existing in the shop, such as the tramrail system for bringing molten metal to the pouring stations, and the overhead belt conveyor system for supplying sand to the molding stations. In fact, the whole three-dimensional outline of No. 1 conveyor route in the casting room was laid out with strings prior to erection to insure no unexpected obstructions that might upset calculations. Between production lines 5 and 6, for example, the monorail had to make a gradual ascent and descent of 168 feet in length to surmount a hot-metal tramrail that ran in between these two production lines. A similar situation existed between lines 6 and 7, which explains why lines 3 and 4 were made to precede 7 in order of pickup.

At all points where the conveyor monorail is more than 7 feet from the ground, substantial pan guards have been provided underneath the line for safety in the rare event of breakage of carrier or falling casting.

The conveyor length from No. 8 shakeout to No. 1 shakeout is 732 feet, involving 61 minutes' traveling time.

After leaving the last point of pick-up at No. 1 shakeout, the conveyor proceeds outdoors and gradually ascends into a cooling tower 200 feet further on. This tower is an open-sided steel structure, about 40 feet high, with protecting roof to keep out rain or snow. The conveyor zigzags slowly downward through four tiers of the tower, and then travels 192 feet from the bottom of the tower into the cleaning room. The total distance covered in the cooling tower and approaches is 3240 feet, involving 4½ hours' time. This time was determined by careful tests as sufficient to permit cooling of all castings down to handling temperatures.

Once inside the cleaning room, the cooling conveyor carries the castings at working level to a knockout operation;



On arrival in cleaning room, cooled castings are removed (at left) from cooling conveyor (coming down from above), passed over a knockout operation for removal of crusty sand, transported on roller conveyor to overhead cleaning conveyor (right) where they are put in basket-type carriers or special carriers for cylinder blocks and heads

Layouts of cleaning and shipping conveyors run parallel, after preliminary cleaning operations, so that finished castings can be transferred from one to the other at any point that scheduled operations have been completed. Cylinder heads on pallet in foreground of the photograph below are specially routed into nearby freight car

As finished castings are delivered by overhead conveyor into shipping room, they are sorted and stacked on pallets. Unit loads are moved by lift-truck directly into waiting truck, or elsewhere awaiting shipment

here the castings are removed from No. 1 conveyor, passed over the knockout operation to remove final traces of sand loosened by cooling, and transferred to No. 2 cleaning conveyor. The No. 1 conveyor returns unloaded for 648 feet to No. 8 shakeout in the casting room where it resumes the cycle. Complete cycle takes 6 hours and 25 minutes.

Based on an average production of 30 tons per hour, No. 1 cooling conveyor carries more than 120 tons of castings at any one time. Only three 5-hp. motors are required for motive power, and are more than sufficient for any overload.

Cleaning Conveyor

The No. 2 cleaning conveyor, only 1140 feet in cycle length, carries all castings through the various operations in that department. It remains at working level throughout. This conveyor also uses a 6-inch monorail, and has 380 carriers spaced on 3-ft. centers. Soon after leaving the knockout, all castings are transferred from No. 2 conveyor to a short overhead trolley conveyor that circulates in and out of the large No. 1 shotblast machine, and delivers them for transfer back to No. 2 conveyor.

At the next turn of the conveyor all heavy castings are taken off and distributed to the chipping lines. Railroad rails of 85-lb. weight were substituted on these lines for roller conveyors because of their ability to withstand the wear of the process. Each chipping line consists of three or more closely placed parallel rails, at working level, whose bearing surfaces are kept oiled to permit easy sliding of castings down the line.

Heavy castings proceed down the rails to water test and inspection operations. After inspection, these castings are either moved by two-wheeled truck into freight cars on siding just beyond the No. 3 shipping conveyor, or are placed on the shipping conveyor for transport into the shipping room. Power hoists are utilized in the transfer to No. 3 conveyor.

Rejected castings are placed on No. 3 conveyor and carried to No. 2 shotblast machine for reblasting. This procedure avoids backtracking of the product. After the No. 2 reblast operation, these castings are transferred back to No. 2 cleaning conveyor to be carried to welding and grinding operations further on. Following these operations, castings are returned to No. 2 conveyor, and ultimately they recirculate back on this conveyor to the water test and inspection take-off points. From there, as previously shown, they are routed to No. 3 conveyor for shipment.

Easy Transfer

Light castings, after they leave No. 1 shotblast machine, continue on to No. 2 shotblast machine, then proceed through the various operations needed to finish them. Not all castings require the same processing, therefore the layout of No. 2 and 3 conveyors has been arranged to enable easy transfer from one to the other at practically every operation. Castings that reach the tumblers are returned after that operation to No. 2 conveyor, carried around the farthest corner, and routed across the grinding and inspection operations to No. 3 shipping conveyor. Some castings are taken off No. 2 conveyor at the grinders before it makes the turn around the tumbling department, and are routed through inspection to No. 3 conveyor.

For Finished Castings

The functions of No. 3 shipping conveyor have already been made evident. Primarily, of course, it is intended to convey all finished castings to the shipping department. This 4-in. monorail conveyor is 940 feet in cycle length. It has 282 carriers spaced on 42-in. centers. As the castings are conveyed into the shipping room, they are taken off the carriers, sorted, and piled on wood pallets to make unit loads. Loaded pallets are moved away by a fork lift truck, sometimes directly into a motor truck waiting at a nearby platform. Other loads may be taken directly into a freight car on the siding next to the shipping room, or may be stored temporarily elsewhere on the floor waiting to be shipped.

Summing up the over-all function of mechanized handling in this plant, it has created a constant flow of the product from the first to the final operation. Management has seen this transformation from a batch-lot to a production-line basis, and has become convinced of the value of conveyorization. This conviction is so strong, in fact, that no job in the plant is lined up and approved without first considering what can be done by mechanized handling to make that job easier, faster, safer, and cheaper.

Applying Wage Incentives to Job Shop Operation

R. P. WRIGHT, Chief Industrial Engineer, Edo Aircraft Corporation, College Point, N. Y.

STANDARD OPERATING PROCEDURES and times, too often considered impractical in job shop production, have been developed at Edo Aircraft and provide the basis for a wage incentive plan which has proved profitable for all concerned. Management benefits through increased output. Workers are provided with an incentive for increasing their productive effort and receive substantial monetary rewards.

Practically all of Edo's production is of the job shop type because floats, aircraft, and aircraft accessories are not manufactured in a volume comparable to automobiles, washing machines, and refrigerators. Consequently, the company was faced with the vital need of finding some agency that would assist in immediately increasing essential productive effort. Thus the decision was made to develop a wage incentive plan that would fit job shop operations.

Study and analysis of production definitely demonstrated that there were a large number of repetitive basic operations with uniform processing elements for which standard times could be developed. Since the industrial engineering staff was insufficient in size to isolate, analyze, and rate these operations and elements, an industrial engineering firm was engaged to assist in the development of basic elemental standards.

Research and study then resolved Edo's wage incentive problem into three major parts:

1. Wage incentives on fabrication of detail parts by direct labor.

2. Wage incentives on subassembly and final assembly operations by direct labor.

3. Wage incentives on indirect production labor.

These factors were severally and sequentially treated, starting with installation of wage incentive coverage for detail parts manufacture.

Although as a general rule the company's product units are ordered in limited quantities, there are a great many component parts in each unit. For instance, one type of float may have only a few thousand parts, whereas another type or model may have as many as 15,000 or more.

The precision, contour, component parts material, and their general application vary substantially, yet as a rule many of the fabrication elements follow a generally similar manufacturing pattern. In other words, detail production elements follow, a generally basic formula with minor variations supplemented by applicable machine and equipment set-up time.

In order to catalog and identify these elements for quick and accessible reference use, basic elemental standards were compiled in tabulated record form.

Development of these standards by

EDO AIRCRAFT CORPORATION
ELEMENTAL STANDARDS

RIVET

Element Number	Element Description	Unit	Standard Minutes
Air Gun:			
229	5/32" Rivet	Rivet	.050
239	3/16" Rivet	Rivet	.055
232	3/32"—5/32" Rivet Using Long Bucking Iron	Rivet	.100
261	3/32"—3/16" Rivet on Model #70 Stern Assembly	Rivet	.075
One-Shot Riveter:			
231	1/8"—3/16" Rivets	Rivet	.055
251	5/32" Rivets—2 Shots—Allow on Martin Spar Only	Rivet	.065
Portable Squeeze Riveter:			
230	1/8"—3/16" Rivets	Rivet	.100
Upright Squeeze Riveter:			
230-A	1/8"—3/16" Rivets	Rivet	.090
Edo Squeeze Riveter:			
235	1/8"—3/16" Rivets	Rivet	.180
Hanna Squeeze Riveter:			
233	3/16"—5/16" Rivets	Rivet	.180
234	3/8"—1/2" Rivets	Rivet	.240
Erco Riveter:			
243	5/32" Rivets	Rivet	.060

Figure 1. Sample page of elemental standards—they happen to be riveting standards—which were developed at Edo Aircraft and are being used successfully in the application of a wage incentive plan to a manufacturing operation that is primarily job shop in nature

STANDARD DATA

BULKHEAD STATION NO.....MODEL NO.....PART NO.....

Description of Part	Average Width Over 3"	Number Pieces	Number Rivets	Length of Part	Length Total	Place Cleco	Adjust Cleco
Doubler	5	1	48	44 (Over 3") (Width)	88	3	
Bottom Outer Angle T		2 1R-1L	30	12	Gun 24	4	
Bottom Inner Angle T		2 1R-1L	24	10	Gun 20	4	
Stiffener Inner and Outer L		4 2R-2L	40	18	72	6	6
Stiffener Center L		4 2R-2L	58	26¼	105	8	8
Deck Angle T		2 1R-1L	12	6	Gun 12	4	
Deck Center Angle T		1	13	11	Gun 11	3	
Side Angle T		2 1R-1L	52	18	Gun 36	6	
Gusset Walk Rail (Casting)		2 1R-1L	Squeeze 14	2¼	4½	Screw 4	
Gusset Deck Rail (Casting)		2 1R-1L	Squeeze: ⅛ — 2 5/32—12	2¼	4½	Screw 4	
Waterstop Right and Left		4 2R-2L	Squeeze 8	2½	10	Screw 4	
Waterstop Center		2 1F-1A	Squeeze 7	5	10	Screw 2	
Clip Corner Chine		2 1R-1L	4	1	2	Screw 2	
Clip		1	1	½	½		
Total		31	325 Squeeze 43 1 Shot 282		399½ Gun 103 Brush 296½	Cleco 38 Screw 16	14

Figure 2. Standard data sheet provides essential information

making time studies of all operations of every part in its production sequence would have required a prohibitive expenditure of time and time study manpower. The first step, therefore, was to isolate these repetitive operations into broad classes and then consolidate them into basic element groups.

Drilling holes, riveting, routing, countersinking or dimpling, pressing, and shearing are examples of standard operations on which a base time is universally measurable. The actual individual operation time is static and is affected only by refinement of tools, jigs, etc., while set-ups can be standardized and applied in ratio to the order quantity base.

With the primary grouping of these elements established, the next step was further to concentrate these groups in relative units. For instance, riveting elements covered usage of air guns, one-shot machines, portable squeezers, Erco machines, etc., and the various rivet sizes, types, and material. Drilling was similarly treated. Shearing times were set by machine and shear size cut. Band sawing, routing, and sanding, being set on linear inch measure, varied with respect to material gage and contour.

Time studies were then taken throughout daily operation, regardless of order sequence, until sufficient data had been developed to establish a sound final basic value for each basic element, and these elements were compiled in a standard basic elemental tabulation manual.

Basic elements cannot be considered as static factors, however, because new designs, material, equipment, and method change make it necessary to carry on constant competent time and methods study to maintain equitable standards and wage incentive times.

A sample page of rivet standards is illustrated in Figure 1, and the use and application of these elements for detail production wage incentive is covered later in this article.

Use of Basic Elements

Many operations required for subassembly and final assembly are covered by the same basic elements used for detail parts production. For example, drilling and riveting element tables contain many base time values applicable to both detail manufacture and fabrication or assembly operations.

However, on assembly rates the rest and delay factors are not the same as for detail production because assembly operations essentially require application of labor power whereas detail parts are generally machine production items.

Assembly of units as a simple entity is one type of problem, whereas unit assembly on a paced or cycle line operation requires an entirely different treatment. During the development of a wage incentive for cycle operations, there was careful consideration of its possible value for this type of production because there was some thought that production delivery schedules might limit incentive possibilities. Experience did not prove this to be a true factor, however, because standard methods substantially lowered labor-hour input, provided substantial bonus earnings, and helped assure scheduled deliveries.

Basic values for cycle assembly* operations are determined by time study after standard methods and procedures have been engineered. These base values are then translated into operation element time values and operation sequence. Operational sequences are next arranged in cycle work stations, and all work stations balanced to provide a scheduled delivery time and also the unit standard hour assembly time.

* For details, see "Cycle Assembly System Halves Man-Hours," FACTORY, September 1945.

Wage incentives on cycle operations are paid only for completed production of a unit. First consideration seemed to indicate that the entire cycle line groups or teams might be so large that some part of the individual incentive might be lost. Again this premise was not found to be factual but theoretical and each of these lines of 50 to 70 workers developed a surprisingly productive unity.

The danger of setting individual standards for each work station was immediately apparent. Work station standards offer a greater opportunity for smaller groups to increase their standard hour earnings, but such practice would require accurate and immediate timekeeping to cover the completion time of each station, and to make sure that *all work was actually done*. With standards for individual work stations it would be possible for a station to call its cycle work "complete" ahead of cycle schedule time, although that condition would not be entirely true. Such a station could, of course, then use the balance of cycle schedule time to "polish off" its station work without charging that time against standard hours.

It is readily understandable that the task of watching such possibilities through inspection, timekeeping, and supervision would be extremely onerous. This is one of the disadvantages connected with individual work station standards. Therefore, standards were set to cover *each completed unit* as it left the line with the result that line crews quickly developed an excellent spirit of cooperation and teamwork, with the faster stations helping the others.

Wage incentives for cycle assembly operations are developed by establish-

EDO AIRCRAFT CORPORATION
Standards Dept.

COMPUTATION SHEET

Application of Basic Rates to Standard Elements

Part No. XYZ 25 Part Name Hand Hole Ring
Operation No. II Operation Name Burr and Dimple

Element No.	ELEMENT NAME	No. of Times	Unit	Unit Time Factor	Base Time (Min.)
1	Remove drill and insert burring tool	1/50	occurrence	.000	.000
470	Pick up part from bench	1	piece	.000	.000
214	Burr hole to be dimpled	8	hole	.000	.000
635	Dispose of part to bench	1	piece	.000	.000
874	Change rivet set to dimpling set	1/50	occurrence	.000	.000
470	Pick up part from bench	1	piece	.000	.000
225	Dimple on "One Shot"	8	hole	.000	.000
635	Dispose of part to bench	1	piece	.000	.000
					0.000

Dept. No. 7
Date 7-10-45
Comp. By: A. B. Jones

RECAPITULATION
Total Base Time (Min.) .000
R. D. Allowance @ 20 % .000
Standard Time (Min.) .000
M.H. .000
Value -
Part No. XYZ 25

Figure 4 (above). Computation sheet used to build standard times

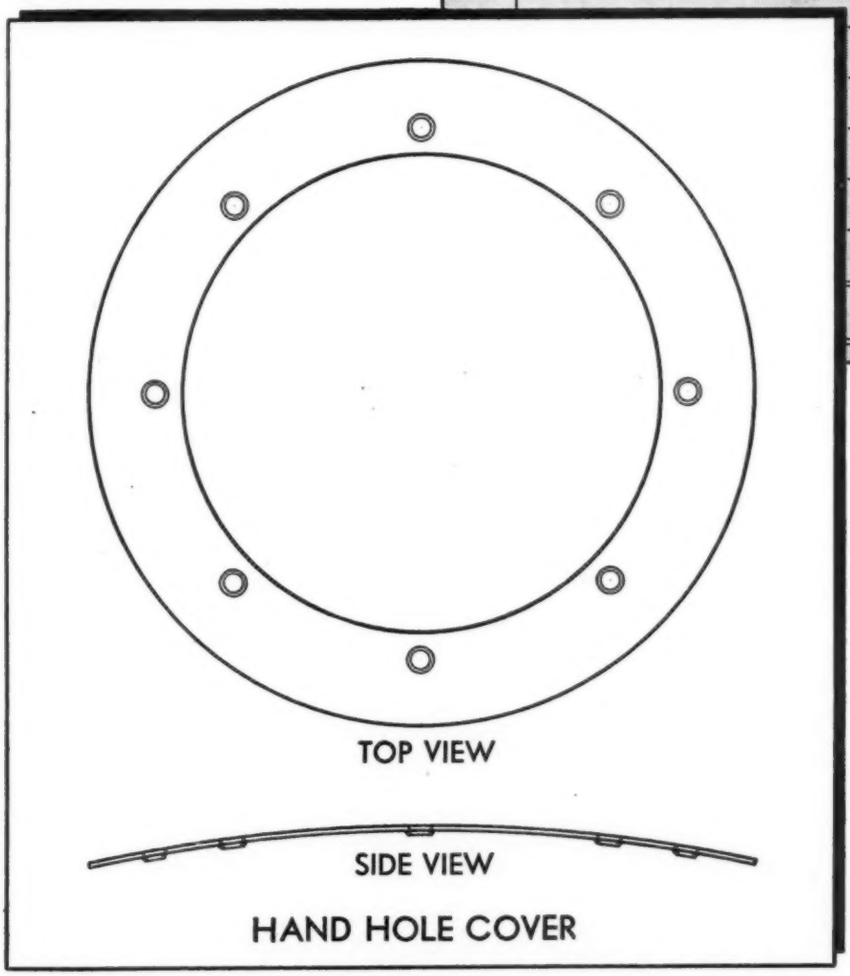


Figure 3 (below). Sample part on which standard times are built up from basic elements

White—Stds.
Yellow—Production
Pink —Planning
Green—Bonus Adm.

No.

EDO AIRCRAFT CORPORATION

TIME STUDY DEPARTMENT

SUMMARY OF DEPARTMENT OPERATION RATES

Effective on Date 7-11-45

Effective on Group G

Part No. XYZ 25 Part Name Hand Hole Ring Dept. No. 7

Material 24 ST Dimension Gage

Operation No.	OPERATIONS	STANDARD TIME (Min.)	STANDARD TIME (Man-Hours)
II	Burr and dimple	.000	.000
	TOTALS		

REMARKS:

Date Compiled 7-10-45

Compiled By A. B. Jones

Approved B. J. Green

Date 7-10-45

Stds. Dept.

Figure 5. Form on which standard operation build-ups are totaled and issued

ing standard assembly methods, then base standard times which are plotted on a learner curve chart and issued accordingly, on a diminishing scale covering production progression.

In actual practice the inherent ability of labor to increase production skill, develop better methods of work (minor not major revisions), decrease labor hour input, and coordinate its teamwork has provided substantial bonus earnings, satisfactory to the workers because of the extra pay and to management because of the increased production and lowered overhead cost.

In Edo's application of direct labor basic elements for wage incentive purposes, procedure is as follows:

1. Development of data sheet (Figures 2 and 3).

2. Standard operation build-up of standard times from basic element manual (Figure 4).

3. The standard operation build-ups (Figure 4) are totaled and issued on a face sheet (Figure 5) to the production department foremen and the bonus accounting department. This provides production supervision and workers with the standard rate for each job or operation so that they can (if they desire) keep informed as to earned standard hours for that bonus period.

When job production is completed, job move tickets are issued and the ratio of earned standard hours total to the actual labor-hour input total provides the earned bonus percent.

Naturally, labor is expended at times on non-standard items, and such work is covered by a time allowance (form not shown), which provides removal of such time from the total hours worked before comparing the labor-hour input with the earned standard hours.

Trainee allowance terms are also set up in accordance with specific job requirements, and this class of labor is not charged against earned standard hours until term allowances have been completed. Thus the wage incentive bonus is paid only for work on standardized production.

There are several types of work which, although definitely a part of productive effort, are not directly measurable for standard rates.

Based on the fact that these workers perform tasks that directly affect production labor, a base ratio rate was established relating their productive service hours to the standard hours earned by direct labor. In some cases this ratio was based solely on the service relation to one production department's standard earned hours; in other cases the total standard earned hours for all productive departments were used for comparison.

This "service bonus" is based on a budgeted allowance of service labor hours in relation to production manhour schedules, which provides a potential base for bonus earnings with an opportunity for increasing bonus earnings through proper control of service labor. By the same token, failure to meet lower direct labor standard hour input with a corresponding reduction of service hours penalizes service bonus earnings to a corresponding degree.

How Unreasonable Attitudes May Be Counteracted

R. ROBERT COHEN, Lieutenant Colonel, MC, AUS, Consultation Service, Army Service Forces Training Center, Aberdeen Proving Ground, Aberdeen, Md.

An Army technique of attitude conditioning is presented here because the resentment factors encountered in military service have almost exact counterparts in industry. The author suggests that, by changing the context of the performance devices described herein, they can serve equally well in conditioning attitudes in industry

CONCRETE PERFORMANCE DEVICES have been developed and used by the Army to attack intangible resentments and to demonstrate to servicemen wherein their unfavorable attitudes are unreasonable.

When soldiers were brought back from overseas duty for retraining in another branch of the service, for refresher training in military and technical subjects, and for redeployment training as replacements in another combat theater, unfavorable attitudes of many men based on resentments and fears and fatigue were constantly present and getting progressively more and more marked. In short, unfavorable attitudes on the part of many men toward further training became one of the most difficult problems in training centers.

Nine Resentments

To ascertain what those unfavorable attitudes were, was not at all complex. Simply listing the most prevalent attitudinal problems requiring referral to Consultation Service easily brought out the offending resentments. These, nine in number, were (1) broken promises, (2) bad breaks, (3) training center discipline, (4) the war's over for me, (5) casual pools, (6) refresher training, (7) why a new job, (8) changes at home, and (9) lack of use of practical overseas experience.

To alter those attitudes favorably, to explain to each soldier the reason for his resentments, to make him understand the continued need for a sense of personal mission in the war with Japan, and to make him continue to function as part of a team and thus submerge his personal desires, constituted a much more difficult matter. Several mass methods to cope with this problem proved unsuccessful. But in February, 1945, it was observed that many soldiers' attitudes toward refresher military training were less unfavorable after men had demonstrated their deficiencies to themselves by performance tests. It was then decided to attack their intangible resentments by concrete performance devices.

For favorable conditioning, it was felt that the material to be presented must be simple, familiar, yet novel in presentation and based on sound psychological principles. To reinforce the conditioning process, manual performance on the part of each orientee, visual presentation, and concealed repetition were added. And it was made mandatory that the explanations be made in an individual manner, that each instructor be himself an overseas-returned enlisted man, and that the presentation be given as quickly as possible after a man's arrival at camp.

The Approach

To translate these intangible ideas into practical reality, a former barracks was remodeled and nine booths were installed, one for each attitude problem. Men in groups of eight were brought into the exhibit building and introduced to the attitude conditioning center by the sergeant in charge in this manner:

Men, we are going to ask you to help us out here for about an hour. No doubt you are wondering what goes on in this building and asking yourselves what sort of test you are going to get now. Let me clear that second point first. I want to impress upon you that while you are in this building you take no test of any kind. You will not be graded on your ability or your actions, nor will they have any bearing upon your future status in the Army.

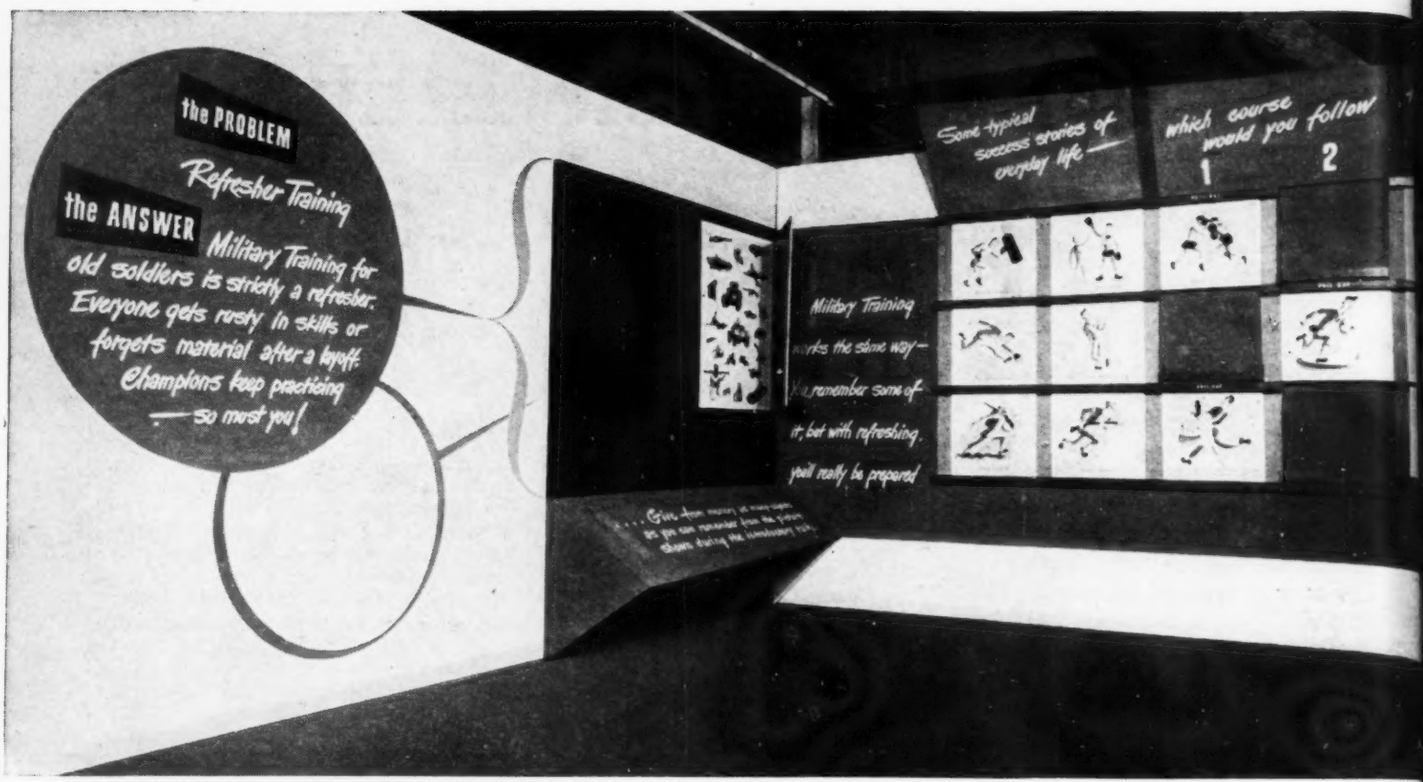
In this building we have something entirely new in the Army. For some time the powers that be have realized that perhaps some of their methods and routine may be a little confusing to the average soldier. They know, too, that many of you more experienced soldiers have worth-while ideas for improvements on present methods, as well as on equipment and armament. This, then, is an experiment by the Army in a sincere effort to improve the armed forces as a whole and Ordnance in particular because, of course, on this post we are most interested in Ordnance. We ask your cooperation as the men most qualified to say what is needed to help us make this experiment a success.

Naturally, you are going to ask: "What do I get out of it?" or "What could I do? I've made suggestions before, but no one paid any attention to them."

As to the first question, we don't promise you that you are going to get a thing out of it, although a little later I am going to show you that it is quite possible for you to receive a material reward. As to how the experiment is going to be conducted, we have here eight booths, in each of which we have a graph, demonstration, or chart on which you will recognize an M-1, light tank, reconnaissance car, a bozooka, and a number of other pieces of equipment. In each of the booths we have an experienced soldier like yourselves. In fact, they are all returnees. They are there to explain to you any questions you may care to ask. You will be allowed a suitable length of time in each booth, and upon the completion of your tour of the eight booths we are going to ask you for any suggestions you may have for improvements in the Army.

We are not, of course, interested in petty gripes. What we want are suggestions that will help the Army function more smoothly, shorten the war, and make life easier for all the enlisted men. You are the men who know what is needed. Will you help us, and in so doing, help yourselves?

I realize that some of you men fall into the 85-point group and will soon be receiving your discharges. Perhaps you men will feel that this is not for you; that you are just about finished with the Army. I ask you, though, to think of the buddies you are leaving behind. What better gift could you leave for us than to suggest some change or improvement that would make life easier for us or bring the end of the war a little closer? The fact that you have the required number of points proves that you have had more than average experience and are therefore the ones we naturally turn to for help. We are asking you to help us out here, it's true, but remember that each one of you is one of us. When you help us you are really


the PROBLEM
Refresher Training
the ANSWER
Military Training for old soldiers is strictly a refresher. Everyone gets rusty in skills or forgets material after a layoff. Champions keep practicing — so must you!
Some typical success stories of everyday life
which course would you follow
1
2
Military Training
remember some of
it, but with refreshing,
you'll really be prepared

Booth 6 is typical of nine demonstration booths used at the Aberdeen Proving Grounds to convince returnees from overseas that certain resentments they cherish are unreasonable. Here, for instance, they learn the why of refresher training. Each man is asked to recall and write down on the blackboard as many items as he can from the chart he saw at the beginning of the "course." Of 23 objects shown, he may remember five. But, when his memory is refreshed by another look at the same chart, he demonstrates to himself that he can recall many more. Next, in three "success stories of everyday life," he learns how training pays

helping yourself. So please go into these booths with an open mind and we'll all benefit from our common knowledge and experience.

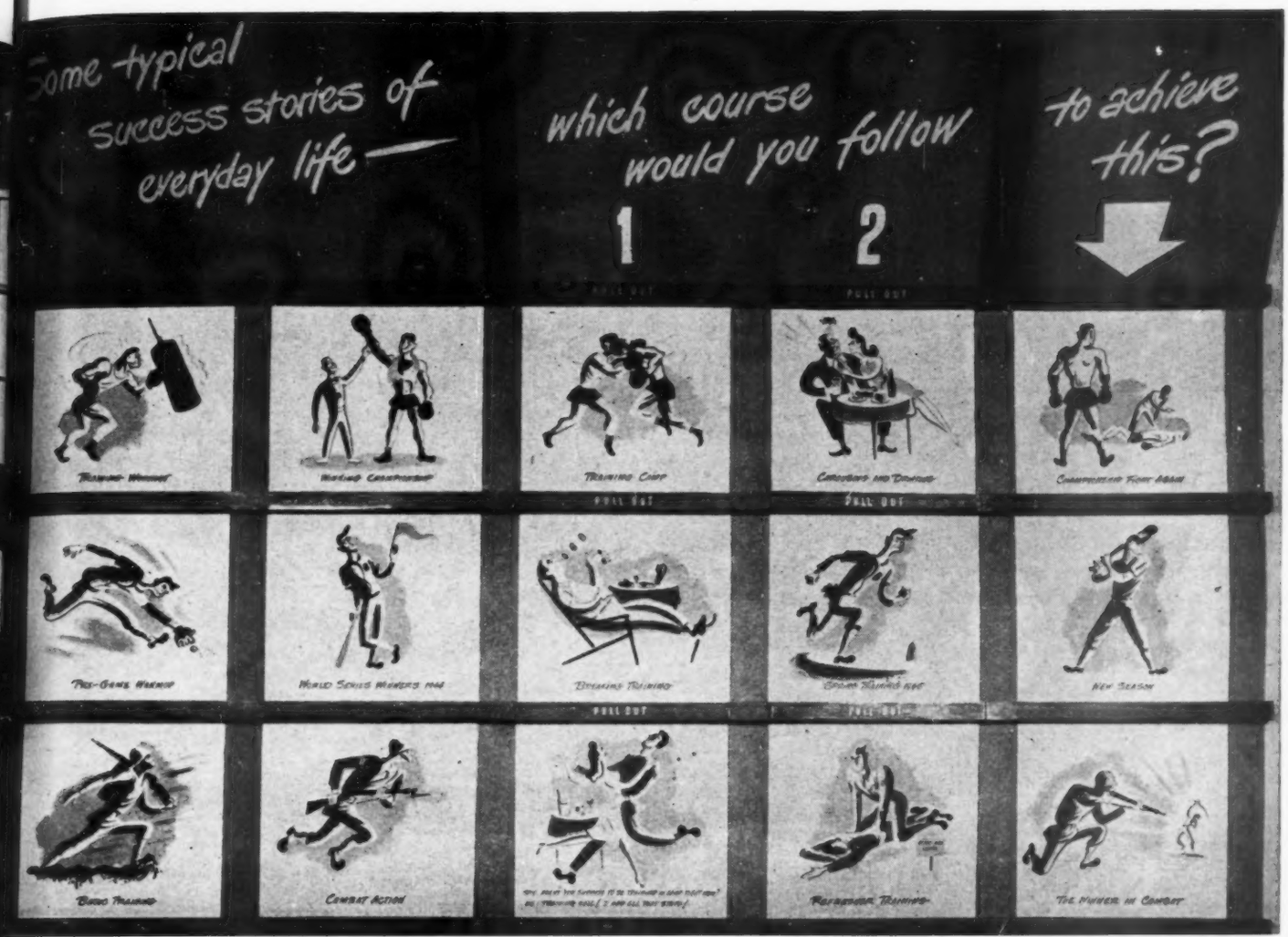
One orientee was then assigned to each booth where an enlisted-returnee took over as demonstrator. Men remained in each booth about five minutes and then rotated through the remaining ones.

1. Broken promises. A series of four familiar situations in cartoon style are presented. The orientee enters into the solution by changing each series (manipulating knob) and moving an arrow to indicate his idea on the most sensible action. Thus he arrives at the obvious answer: "Promises are often impossible to fulfill because of unexpected conditions which arise to block them."

2. Bad breaks. Booth 2 takes up the problem, "How lucky are you?" The orientee is first asked to evaluate his "luck reading" on a "luck meter." Next, in a word-association test, he is asked to respond to the words *foxhole, sharpnel, battle fatigue, prison camp, plane crash, torpedoed ship.* His answers are written down on a blackboard. Then he is asked to view a series of paintings depicting a starving family, bombed out home site, amputee, marching men with depleted ranks, and last a PX scene. In each situation, except the last, a missing element is present. The orientee is asked to place the proper hang-on upon each picture and to supply the missing element. The obvious answer, "You really are pretty lucky, aren't you?" comes out and the soldier is then asked to re-evaluate his "luck-reading" if he desires. (The many raises in "luck-readings" have been astounding!)

3. Training center discipline. This factor is broken into two parts, orderliness and the role of resentment. To bring out the first, the soldier is shown a box of assorted bolts and nuts in helter-skelter array and is asked to select quickly five $\frac{5}{16}$-in. nuts. When this becomes a tiring task, he is shown another box containing the assortment nearly separated into stacks according to dimension. Here it is easy to pick out the designated nuts required; thus the need for orderliness in discipline is clearly shown. Next the orientee is given a short explanation of resentment, how it arises when a man compares himself with civilians at home while on his 21-day debarkation furlough, and how this resentment, carried over into the training center, can distort his image of discipline. Inside two boxes faced with heads—one in which resentment, though normal, is under control, and the other in which resentment, out of control, is the greatest factor in a man's "brain"—two images are present. The soldier is asked to look through the eyes of the "normal head" and sees a normal image—an officer inspecting a soldier's rifle. When he looks through the eyes of the abnormally "resentful head," however, he sees a distorted image—the officer, still inspecting the soldier's rifle, appears to be ready to strike him with it.

4. The war's over for me. Booth 4 takes up the problem of redeployment with "There's still the Jap." The answer is worked out through an explanation of wishful thinking as opposed to reality, and by actual manipulating of soldier-models representing our Army, the Nazi forces, and the Jap. Wishful thinking is shown as a shutting-out of reality by figurative cotton plugs in the ears and window blinds over the eyes. The orientee, asked what must be done to allow the real facts to get into the soldier's mind, works out the answer for himself



by actually removing the symbolic plugs. Next, he is asked to manipulate manpower in the Army, so that two balance-pans representing the ETO and Pacific Theater come out in our favor. In order to outweigh Jap power, the orientee must transfer American soldier models from the ETO pan, now weighted in our favor, to the Pacific pan, not yet weighted in our favor.

5. Casual pools. The orientee is seated at a table and acts as the Adjutant General. The table-top shows movements of technical specialists from the various pools and depots to the many combat theaters. The orientee actually moves roughly a dozen checkers, representing different Ordnance specialists, through replacement depots into the theaters by filling telegraphic requisitions. As a result of his manipulations, the answer becomes obvious.

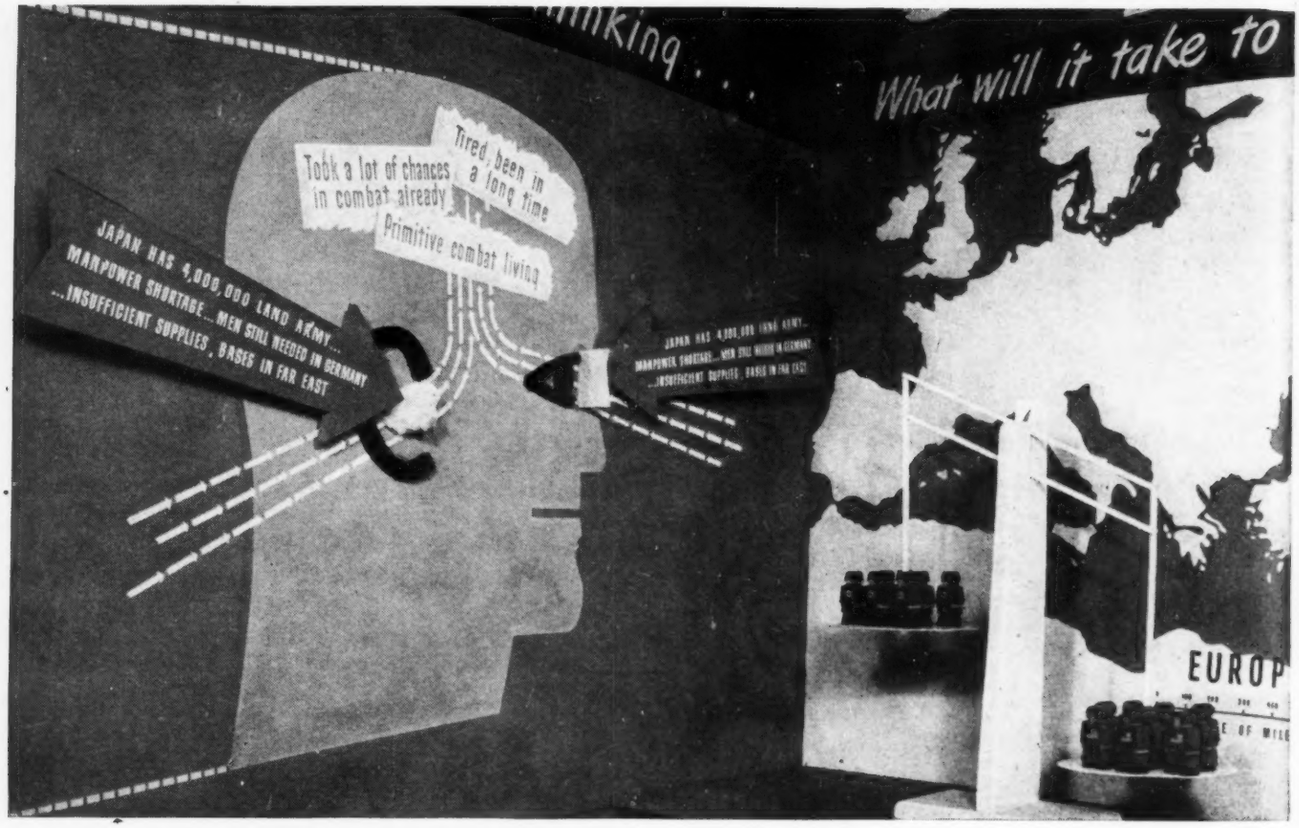
6. Refresher training. Everyone gets rusty in skills after a layoff. As a first convincer, the orientee is asked to recall and write down on a blackboard as many objects as he can from the chart he originally saw—the one with the M-1, light tank, reconnaissance car, etc. Usually of the 23 objects shown, he remembers about five. But when he is refreshed by another look at the same chart, he demonstrates to himself that he can recall many more. Next, in three "success stories of everyday life," he is asked to cover with a panel the action that loses the desirable results.

7. Why a new job? Here the demonstration explains the necessity for a new job—jobs and personnel must change according to the demands of the situation in war. The orientee is first asked to pick from six wrenches two that fit all of a series of nuts of various sizes. The obvious answer, after trial, is adjustable wrenches, those that can fit more than one situation. Next, in a familiar football team situation where excesses in some positions must be made over into scarcities in others, he manipulates the player-models into new positions through training. In a like manner, to change excess ground force personnel into scarce service force specialists, he must manipulate the soldier models through refresher training in order to effect the conversion.

8. Changes at home. First, by rotating two optical illusions, the orientee discovers that "all things change in appearance, depending on how you look at them." Next he is shown how the ordinary American community changed in the transition from peace to war. By pushing a button he is introduced to a picture of a small town "when you went away"; by pushing a second button, a picture of the main changes "while you were away" flashes into superimposed view showing women workers, rationing, scrap drives, housing and factory projects, armament production; by pushing a third button, he sees the changed town as it is now.

9. Lack of use of practical overseas experience. Booth 9 is then introduced to the entire group of eight men with another informal talk by the sergeant:

> This booth, as you can see from the overhead sign, is intended to let you give the Army the benefit of your practical overseas experience. At this time we are going to ask you to give us your ideas for improvements, in writing, with the assurance that all of your ideas are going to be very carefully considered by a suggestion board and


What will it take to
Tired, been in a long time
Took a lot of chances in combat already
Primitive combat living
JAPAN HAS 4,000,000 LAND ARMY...
MANPOWER SHORTAGE...MEN STILL NEEDED IN GERMANY
...INSUFFICIENT SUPPLIES, BASES IN FAR EAST
EUROP

"The war's over for me." Answer to this attitude is worked out by allowing orientee to manipulate manpower so that balance pans representing ETO and Pacific Theaters come out in our favor

that all worth-while ones will be amply rewarded. This reward may be in the form of a furlough, letter of commendation, promotion, or perhaps choice of assignment. If any of you men have trouble in working your ideas or in making a sketch of a new piece of equipment, we'll be only too glad to help you with it and see that you receive the full credit. If at any time in the future an idea occurs to you, no matter where you may be assigned, we urge that you bring it in to us and we'll see to it that your idea receives the same careful consideration.

1. Results, as expressed by the orientees themselves in favorable responses, exceeded even the most optimistic anticipation. Unsolicited comments like "best thing I ever saw," "really explains things," "why didn't we get this before," "this must really be a swell place when they start you out like this," "wish my outfit overseas could've seen this," were plentiful.

2. A method for counteracting unfavorable attitudes by concrete performance devices built around the nine most prevalent resentments is presented. This is a superficial approach which is not intended to screen out or cure, but solely to have all men demonstrate to themselves wherein their resentments are unreasonable.

3. It is felt from observations during the study that individual performance is essential in conditioning of attitudes. Further, although seemingly paradoxical, this is both an individual as well as a mass method. Ideally, 8 men per hour or 64 men per day can be individually processed; but, if necessary, three men at a time can be handled without loss of effect. In this way the rate can be raised to 192 men per day.

4. With the end of the war, the original purpose for these devices is no longer present. The principles, however, remain equally applicable in the changed purposes either of occupation training or of demobilization preparation. Only minor changes in the contents of the devices need be made. (This is now being done at this camp where the changed devices are being used in orienting new inductees as occupation troops.)

5. Since the resentment-factors encountered in the military setting have almost exact counterparts in industry, this method could be easily adapted to industrial attitudes. For example, *broken promises* may well serve as an illustrating resentment factor which affects both military and industrial attitudes. This has been worked out graphically in two cartoon series. In the military series *the promise*, often hearsay, concerns choice of job, as truckdriver. However, when time for the new job arrives, *the unexpected circumstances* in the form of job quotas often necessitates a different job, as carpenter. A soldier then may consider *the promise broken* when he is assigned to the job where he is most needed, rather than the one to which he aspires. Then he either broods and gets sick from disappointment, or runs away "over the hill," or makes the best of the situation in his new job. Similarly, in an industrial series, a foreman's recommendation for promotion is interpreted as a certainty, as *the promise*. Next, when *the unexpected circumstance* occurs in the form of executive disapproval of the promotion because of "present conditions," the worker tells his wife he considers *the promise broken*. As a result, he then either makes the best of the situation, or broods and gets sick from disappointment, or runs away through the medium of alcohol. Thus it is seen that there is a great similarity between many military and industrial problem situations. And, even more important, they may be similarly handled.

Industry Must Find the Way to Palletized Shipping

A. J. MARTIN, Jr., Lieutenant (jg), and J. F. ROBERTS, Lieutenant (jg), USNR, Naval Supply Depot, Bayonne, N. J.

For full utilization of the principles that make unit-load handling successful—and to realize maximum economies from the fork truck and pallet method—plant operating men must consider the shipment of palletized materials as a part of the over-all materials handling picture. Opinions in this timely discussion are those of the authors and do not necessarily represent the policy of the Navy. They are based, however, on intimate acquaintance with the Navy's successful use of pallets

ECONOMY IN INTRAPLANT HANDLING by the fork truck and pallet is well established. The basic requirements are that materials be handled in quantities large enough to make pallet loads; that these materials be tierable (both as to regularity of shape and crush-resistance); and that there be no unusual characteristics in the construction of the buildings which preclude use of pallets.

However, a pallet system designed only for intraplant movements and storage may fall short of a complete application of the principles that make unit-load handling successful. The shipment of palletized materials, to reduce loading, unloading, and turn-around time for freight cars and trucks, must be considered as part of the over-all materials handling picture, if maximum economies are to be realized.

The farsighted concern, appreciating the full scope of materials handling, must therefore determine the practicability of palletized rail and truck shipments in relation to its own operation. The decision to ship palletized can be arrived at only after a realization of all the problems involved and their possible solutions now or in the future.

Following are the major issues that face the shipper of palletized materials:

1. Can loading and unloading time be reduced sufficiently to make major changes worth while?

A good source for an answer to this query is the wartime record of the Bureau of Supplies and Accounts of the Navy, which, required to move supplies with maximum speed in spite of unprecedented shortages of manpower, spent large sums for the development of methods of palletized shipment with the sole object of capturing the tremendous potential savings in time and man-hours. Numerous operational difficulties appeared. That they were overcome, is proved by recorded results which compare loading and discharge time for palletized and non-palletized cars and trucks.

Reports have been published of record performances by the Navy in loading and unloading palletized full carloads of ammunition, clothing, food, and general stores in as little as one-half man-hour per car. Although these reported performances are authentic and indicate potential savings, they were accomplished under ideal conditions and

Moving glued pallet loads of 50-lb. multi-wall paper sacks (containing sugar) into boxcar. Thirty-six loads were placed in car by fork truck. Remaining space in doorway was filled with non-palletized sacks. Pallet is Navy standard hardwood type, measuring 48 by 48 inches

cannot be regarded as typical. However, records over a period of time indicate that normal expectancy for loading or unloading, including removal from or placement into storage, runs from 8 to 15 tons per man-hour. This is compared with a normal of 1½ to 3 tons per man-hour for non-palletized cars. Palletized stake-body trucks and trailers, carrying tonnage approximating 40 percent that of the average freight car, are regularly loaded or unloaded at Naval Supply activities in less than one-half man-hour.

These figures are necessarily quite general, because accomplishments on individual operations are of minor significance when the sizes and weights of materials handled are so various and work is largely non-repetitive. However, there is no question in the minds of persons who have observed this program in day-to-day operation that it represents a potential gold mine of savings in costs to any concern that ships packaged materials in carload or truckload quantities. It can be stated conservatively that labor savings of 50 percent or more are attainable by nearly any shipper.

2. What precautions must be taken to insure an arrival condition that will permit mechanical unloading?

It is not enough simply to place cases loose upon a pallet and place the pallet in a boxcar. The vibrations and impacts sustained in car movement cause such loads to shift and sawtooth or interlock, with the frequent result that packages are dislodged and the pallet load is partially broken down when mechanical unloading is attempted. Even if not broken down completely, the loads will be so misshapen that they must be rebuilt, an operation that nullifies the advantages of pallet-load shipment.

To avoid distortion of the loads in transit, it is necessary to secure packages to the pallets and to each other to form stable unit loads. Common methods for binding loads are steel strapping and glue.

Of these methods, glue is the more economical from the standpoint of outlay for materials, tools, instruction, and application. A full palletized carload can be glued for about $2, or $\frac{1}{10}$ cent per case, including materials and labor. Since glue can be applied by glue rollers installed in a conveyor or by special applicators as the material comes from production, labor costs are negligible.

Freight Charges for Pallets per Carload Shipment

NEW YORK to:	Mileage	Charge for Pallets*	
		Canned Fruits & Vegetables	Clothing
Philadelphia	91	$7.00	$19.00
Albany	142	8.00	23.00
Boston	229	10.50	29.00
Norfolk	346	11.50	31.50
Cleveland	577	14.00	39.00
Chicago	908	18.50	51.00
San Francisco	3171	36.50	110.50

**These figures assume a total pallet weight of 3600 pounds, about the average for a carload shipment using double-faced hardwood pallets. Figures are to the nearest half-dollar.*

Gluing has been successfully used for shipments of items in fiberboard cartons, cloth and paper bags, and wood and wirebound boxes.

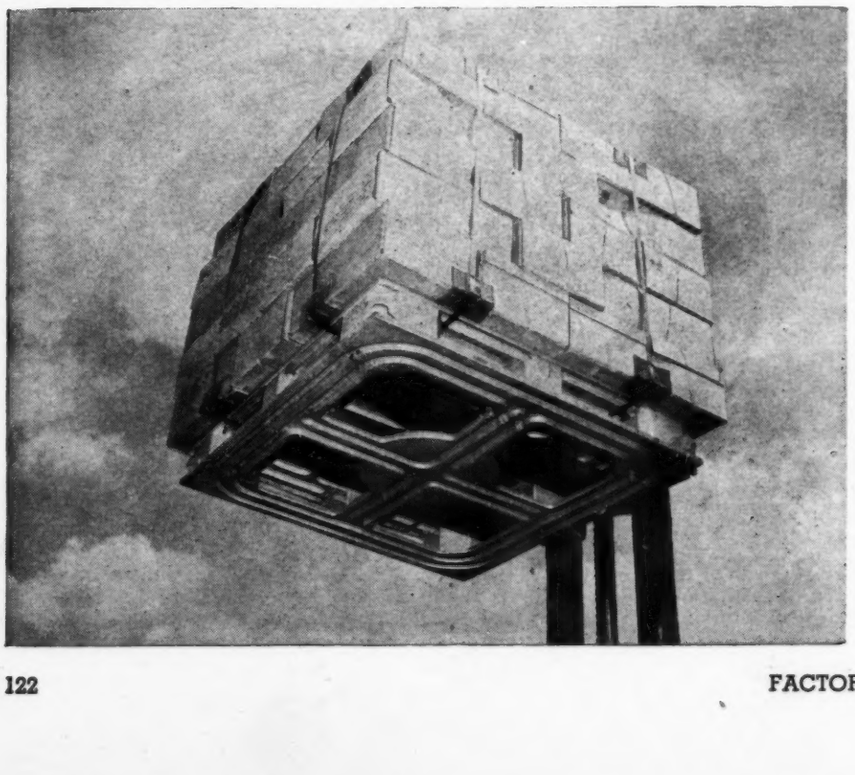
The glue used, manufactured especially for pallet loading, affords high resistance to horizontal thrust, but parts easily with upward pressure so that loads can be disassembled with minimum effort and with negligible damage to containers.

Certain items, such as extremely dense materials or those with irregular or metal surfaces, must be strapped. The cost of strapping the average pallet load is about $1, including labor and materials. Such an expenditure obviously cannot be made simply for the purpose of forming a unit load for one-time shipment, and can be justified only when it results in reduced damage, or substitutes for dunnage that would be required if the material were shipped non-palletized. There are enough shipments for which strap does accomplish these purposes to make its use a definite and profitable part of palletized shipment.

Tests prove that, if the loads are properly glued or strapped, palletization results in less damage to materials and in reduced costs of car bracing.

For the average shipper, then, the requirement that materials be bound to the pallet does not present a problem of sufficient magnitude to limit the operation of a program of palletized shipment.

Distortion of pallet loads in truck



Lightweight aluminum pallet, 48 by 48 inches. Construction permits eight-way entry of truck forks—from any side and from corners. Steel strapping secures load firmly to pallet. Corner protectors guard against crushing of cartons as steel straps are tightened

Removing glued loads from palletized car. Truck on ground level

of the prospective shippers of palletized materials.

Railroads at the present time charge the same rate for pallets as for the material with which they are shipped.

What does this amount to in dollars and cents? Plenty, as is shown in the table on page 122, which gives approximate freight charges for hardwood pallets used in carload shipments of clothing and canned fruits and vegetables, commodities which manufacturers hope to ship palletized. For the purpose of this table, all hauls are from New York City.

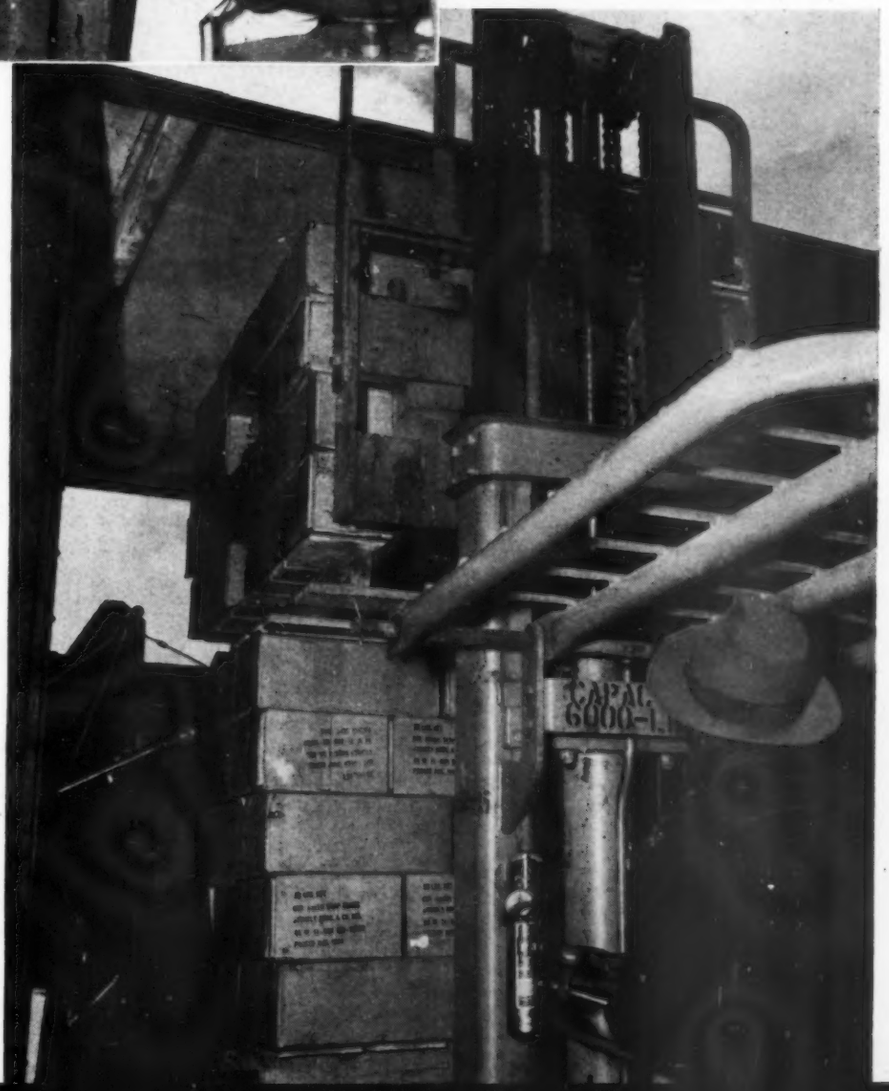
It takes little imagination to predict the early demise of the program of palletized rail shipment for the average shipper, unless immediate action is taken to adjust rates so that the saving in loading and discharge will not be exceeded by the cost of shipping the pallets that make this saving possible. Even for short hauls of low-rate commodities, the charge for pallets is sufficient to threaten the practicability of shipping palletized loads.

To reduce freight charges on pallets, manufacturers expect to market impregnated paper pallets weighing only

shipment is of minor importance, because trucking does not produce the severe shocks and vibrations common in rail movement. On stake-body trucks, rope passed over the load at about 3-ft. intervals, with V-shaped wood protectors between the rope and the upper corners of the load, is sufficient to keep the pallet loads intact. The use of glue, as an added precaution at little additional expense, is recommended. Palletized shipments in closed trucks can be more than adequately protected by gluing the loads, and usually will arrive in good condition with no protection at all.

3. What will the freight charges be on the pallets used in shipment?

Freight charges on pallets used in shipment represent a serious barrier which is being overlooked by many



Fork truck is used in conjunction with hand pallet truck to remove loads adjacent to doorway area when there is no car-level platform. To remove loads from ends of car, fork truck can be hoisted into car

about 15 pounds, selling for 50 cents. Whether these pallets can withstand the rigors of rail shipment, is yet to be determined. Lightweight metal pallets are likewise in process of development, but as yet none that is suitable as to cost, weight, and durability has been introduced.

Development of a lightweight pallet would mitigate the problem of freight charges, but would not solve it completely, especially for long hauls. *The simplest solution by far is the elimination by the railroads of the freight charges on pallets.*

What has commercial shipping to offer the railroads to compensate for such a concession?

First, savings in loading and discharge are reflected in a more rapid turnaround time for freight cars. Over a period this increases the ton-mileage per car and, in effect, increases the number of cars available in the nationwide car pool. This factor is unquestionably of advantage to the railroads, since better utilization of equipment will reduce the building requirements that are certain to come as obsolete cars, kept on the roads beyond their normal life to meet wartime shipping demands, are withdrawn from service.

Second, greater tonnage per car is hauled when the lading is palletized. This has been proved by comparisons of palletized and non-palletized cars received at a large Naval Supply Depot over a period of time sufficient to guarantee accuracy of this conclusion.

Shippers of non-palletized material are reluctant to stack higher in a car than is necessary to meet the carload minimum, because of fatigue and losses in production due to overhead manual handling. As ODT regulations requiring capacity loading are lifted, it is expected that the average tonnage in non-palletized cars will decrease, for the reasons mentioned and because the present railroad rate structure offers no real incentive for loading beyond the carload minimum.

In a palletized car, however, pallets must be loaded solid from end to end in the car to insure a good arrival condition, and must usually be tiered two-high to attain carload weight. This high stacking can be accomplished mechanically with negligible increases in time and effort.

In other words, *the tendency of palletization is to force better utilization of freight cars*, which again is of great advantage to the railroads.

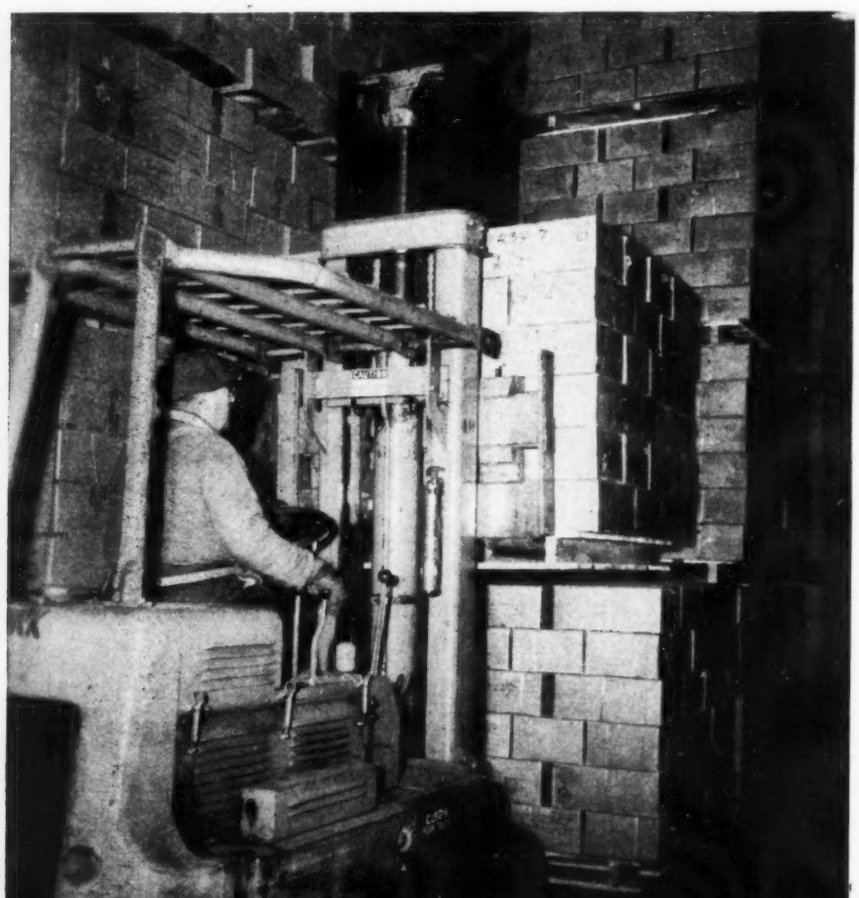
The logical conclusion to be drawn from these arguments is that the railroads would profit by encouraging palletized carloading through elimination of freight charges on the pallets used in shipment.

Since the railroads already make allowances up to 500 pounds for dunnage and do not charge for the weight of permanent dunnage installations, their allowing pallets to travel rate-free would not be exactly a new departure.

Nor would it be inconsistent with the policy of other types of carriers. Truckers have already evidenced recognition of the mutual advantages of unit-load shipment by hauling pallets rate-free and even returning empty pallets to shippers without charge.

Failure of the railroads to make such concessions will largely confine palletized shipping to the trucking field.

That the railroads are conscious of their role in the solution of this problem is evinced by the fact that they are already making studies to determine the economy of palletized shipping from their own standpoint. These studies may well lead to to rate revisions in the near future.



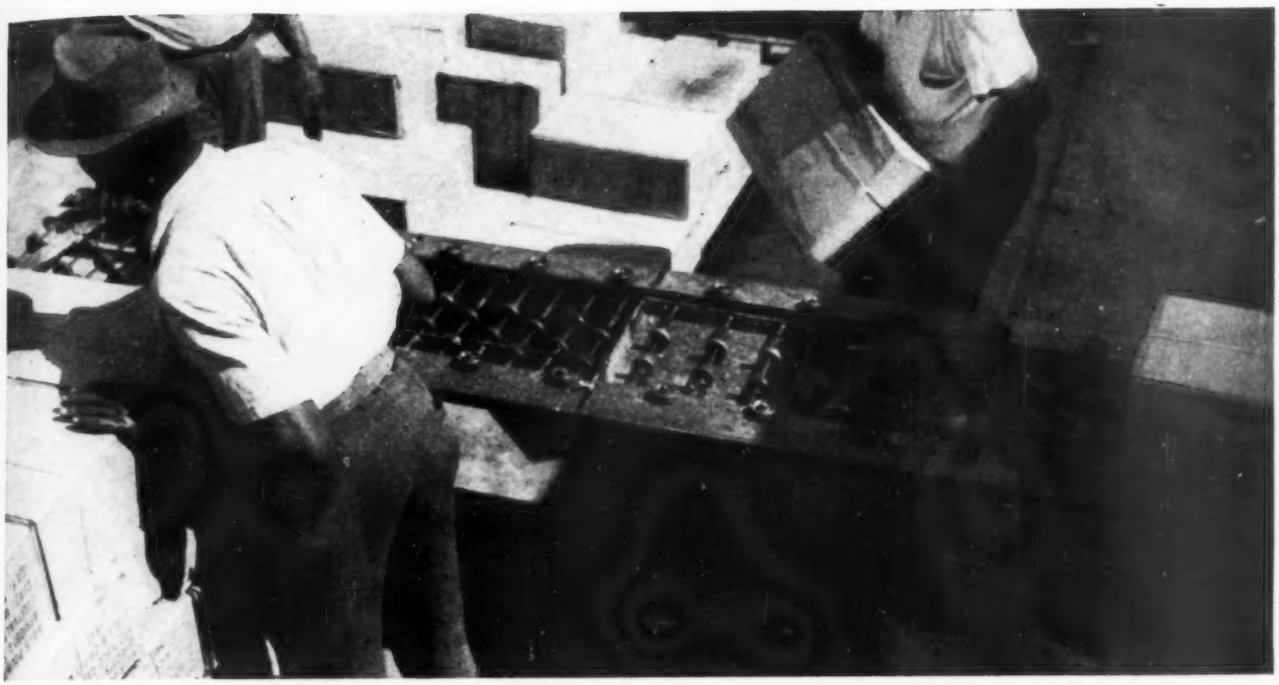
Tiering pallet loads four-high. Use of fork trucks and pallets permits uniform, safe stacking to heights not easily attainable by hand methods

4. How will the shipper be reimbursed for the value of the pallets used in shipment?

No concern will ship pallets to another without assurance of receiving in return the same or identical pallets, or their value in cash or credit.

Return of the same pallets requires additional, uneconomical, and in many cases unnecessary operations, which would indeed be a paradox if included as part of a system that stresses above all the elimination of unnecessary hauls and handlings.

The necessity for physical return of pallets can be eliminated through purchase of the pallets by the consignee, although such a system would not be ideal. Certain concerns, which received more palletized material than they shipped, would accumulate large numbers of pallets, the disposal of which would be expensive. There would inevitably be disputes about the condition of pallets received. In general, this system could only operate among a few concerns or within certain industries, and would not enjoy the flexibility afforded



Glue is applied to cartons through use of glue pan installed in gravity conveyor. As cartons pass over pan, glue is applied in two lengthwise strips to underside. Cartons are placed on pallet at end of conveyor

by an organized system of pallet exchange servicing a larger number of participants.

An alternative is the pallet pool, an association of shippers and receivers of palletized material, which would record pallet shipments and receipts by member concerns; calculate amounts due from or owed to members as a result of their holding more or fewer pallets than their original stake in the pool; arrange for maintenance and repair of pallets; and, when necessary, pick up accumulations of pallets for distribution to members who need them for shipment. By balancing out receipts and shipments, the time of paying for or transferring pallets would be greatly reduced. The fee charged each member by the pool would total much less than the cost of independent arrangements to accomplish the same purposes.

There are any number of agencies qualified to administer a pallet pool. Such an organization would be a profitable venture for an individual enterpriser, or for public warehouses working through a national association. No organization is in a better position to organize pools than the railroads and trucklines themselves, who as actual haulers of the pallets can best verify receipts and deliveries, and already possess the facilities for the movement of empty pallets when necessary.

Regardless of the details of the system, a certain degree of standardization of pallet sizes and designs is mandatory if pallets are to be freely exchanged and acceptable to all participants. Standardization must be based mainly on requirements for shipment, and participating concerns must resolve either to sacrifice some of the advantages of a pallet tailored to their individual operations or to make the necessary changes to adapt their operations and their product to the standard pallet sizes. The Navy has set an excellent precedent by adoption of a standard pallet size for practically all handling. The Bureau of Standards and various private interests are studying the subject of pallet standardization and recommendations for standard pallet sizes suitable for all methods of transportation will be forthcoming.

Toward Standardization

Pallet pools will not be organized overnight, nor will pallet standardization be achieved at once. Local pools are already in operation. In time they will probably form associations covering broader territories. Eventually they may combine into one national organization. Whatever the evolution, it will take time. Temporarily, shippers and receivers will have to make arrangements for purchase or exchange among themselves. It is of major importance, however, that these parties keep up with new developments and with plans for the standardization of pallets and procedures, so that their systems can be easily incorporated into exchange organizations. Failure of individual concerns or industries to take the broad view will inevitably result in such a conglomeration of pallet sizes and designs that a flexible system of pallet exchange will be impossible.

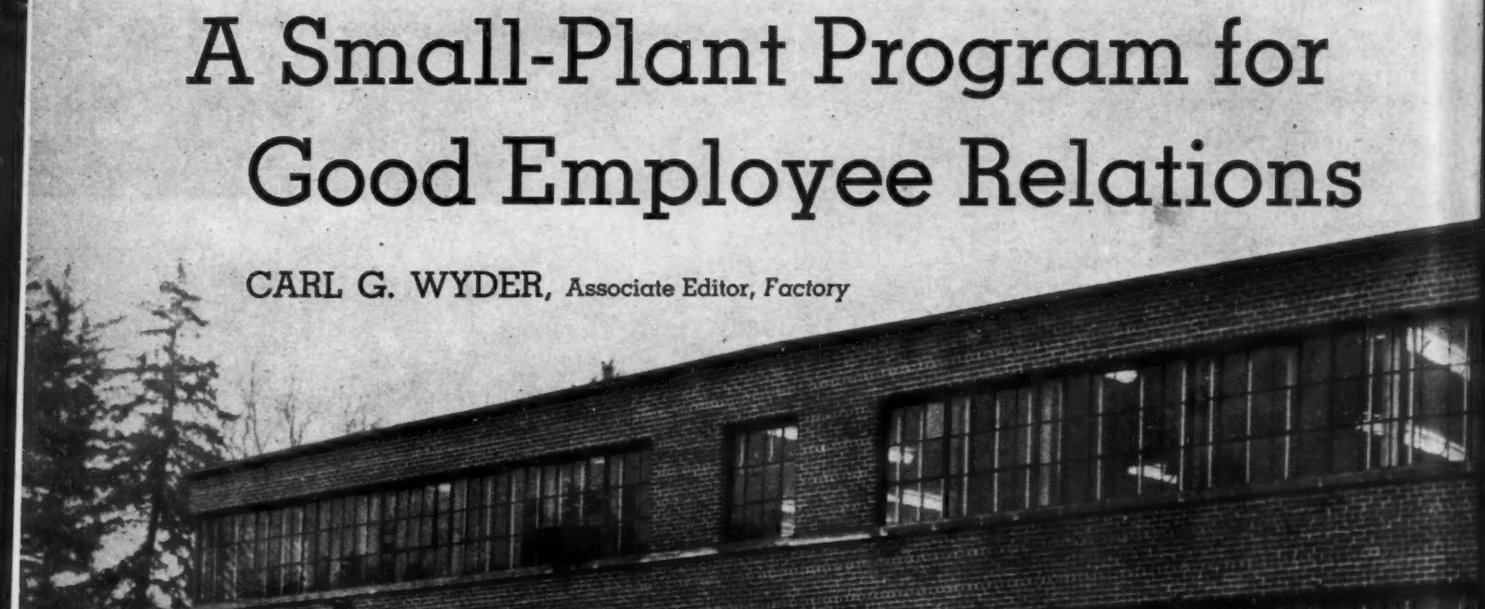
Time may see the solution to the pallet-return problem by radical changes in the design of the pallet itself. Industry has already considered fabrication of a one-way or non-returnable pallet, although as yet none low enough in cost to be feasible for general purposes has been produced. Not impossible is realization of the advantages of unit-load shipment without actually shipping the pallet. A pallet has already been designed that permits handling of pallet and load for purposes of warehousing, but mechanical removal of the load only, to be handled as a unit, for car or truck loading. This pallet, however, only goes part way in that it offers the advantages of unit-load handling only to the shipper. Future developments along these lines may entirely eliminate the problems of pallet return and freight charges.

The foregoing has been presented to describe, without pulling any punches, the major problems that face the prospective shipper of palletized materials.

Potential man-hour savings and improved arrival conditions resulting from palletized shipment certainly warrant consideration in any extensive materials handling program, and deserve the concerted efforts of industry to overcome the obstacles presented by pallet return and freight charges on pallets.

A Small-Plant Program for Good Employee Relations

CARL G. WYDER, Associate Editor, *Factory*



Good to look at from the outside, the Pulverizing Machinery Company's plant is also good to work in, thanks to an industrial relations program planned to keep its 100-odd employees loyal and happy

Editor's note: Never before has FACTORY *presented two articles about the same plant, by the same author, in the same issue.* FACTORY *breaks this long-standing precedent because it believes readers should not have to wait a month to get the rest of the picture of this small plant's successful operation. Turn to page 145, therefore, for "Small-Plant Services for Efficient Production."*

"TREAT THE MEN like members of the family" epitomizes the guiding philosophy of all personnel relations at the small but very modern plant of the profit-sharing enterprise known as the Pulverizing Machinery Company, located 25 miles from New York City in the suburban town of Summit, N. J. That sentiment also includes the girls.

In its numerous applications of this simple philosophy, this plant of only 100-odd workers might offer interesting clues to the answers to many of the personnel problems that today are troubling industrial plants, both large and small. It also might help some smaller plants realize how they can compete with the larger plants in attractiveness to workers, and not have to be satisfied to limp along inefficiently with inferior types of labor.

Being small, in fact, is claimed to be one of the advantages enjoyed by PMC, particularly when it comes to cultivation of the "family" friendly feeling. You begin to realize this as soon as you walk through the plant with the owner, Louis Ruprecht, and hear the men address him as "Lou." Ruprecht insists on this familiarity as an essential externality of the family relationship, and promptly corrects any man who makes the mistake of addressing him as "Mister." That title is reserved strictly for use by female workers, as it should be. All other senior and junior executives are greeted with the same intimacy.

Paternalism, however, is not only considered unnecessary at PMC, it is not wanted. The management heartily believes that every worker must contribute his fair share of effort to the value of the product if the enterprise is to succeed. There is room only for industrious performance here. But it also believes that a fair share of the profits are returnable to the workers in the degree they have helped to create them.

This is accomplished in various ways. Basically, profits are distributed by a profit-sharing plan, augmented by liberal

policies covering pension plan, vacation plan, accident and illness benefits, and life insurance for all workers. Added to this is the encouragement given to many recreational and educational activities.

Have you noticed the absence of the word "employee" so far in this text? All workers at PMC are correctly known as "associates," even though a legal employer-employee relationship exists. (Wherever "employee" subsequently appears in this text, it is used in that legal sense alone.) Management feels that, as an acknowledged "associate" in the business, a desirable worker will rise to the responsibilities of his position and appreciate his privileges more highly.

Is this utopian falderal? Are the motives impracticable? Not if measured by the results secured over the history of the company through times of labor shortages and now when there is so much unrest and dissatisfaction in the ranks of labor in many other plants. For here is a plant where workers are happy and loyal, and labor turnover is negligible. A waiting list of applicants for positions, despite the existence of large and well-organized plants in the surrounding area, testifies to its popularity and attractiveness.

Stayed Through War Years

During the war, most of the pre-war workers stayed on because they valued other long-range benefits more highly than the larger immediate take-home pay that other war plants were offering. In a real sense PMC was a war plant, too, because its products of dustless pulverizing machinery contributed to the manufacture of many war products. Also, more than 1,000,000 pounds of magnesium powder, plus a portion of the powdered atomic bomb ingredients, came out of its plant doors.

But the governmental freeze of basic wage rates at pre-war levels admittedly placed the plant at an apparent disadvantage when weekly take-home pay alone was considered. Despite this handicap (also enforced on many other plants), the company boasts today of 35 associates who have been with it for 5 years and over. Moreover, 23 of them have been there over 10 years. Checking these statistics against the growth of the company from 2 associates when organized in 1923, increasing to 24 in 1933, 65 in 1942, and finally to its present 103, the evident allegiance of associates can only be explained by the good treatment and present and future security afforded them.

Before examining the details of the personnel policies that have been so effective in maintaining such enviable relationships, it might be helpful first to glance briefly at the productive organization set-up. At first view this shows nothing fundamentally unusual. A "directorate" of four men, three chosen by the proprietor—who serves as chairman of the board—devote their entire time to the company's affairs. These four men, as senior executives, each with more than 15 years' experience with the company, specialize in the separate fields of sales, engineering, accounting, and management. There are, in addition, a research director, a plant superintendent, a junior executive committee, and the foremen of the departments.

Management has realized that it must be approachable from below. To reap the full abilities of its personnel, it has set up a committee of six junior executives for the purpose of keeping top management alert and on its toes against any placid acceptance of conditions as beyond improvement. This committee meets biweekly for a session of several hours to discuss changes and improvements that might benefit company operations. It has the privilege of probing into any activity it feels needs improvement, and can submit recommendations to the directorate in practically any phase of the business.

It is impossible to ascribe to any one of several measures adopted by the company the major role in sustaining healthy personnel relationships. They are all considered an essential part of the whole. But perhaps the one closest to the heart of management is its demonstration of its firm belief in the principles of profit-sharing. Profit-sharing was first tried out 13 years ago and has continued ever since on a constantly increasing participation basis. In 1944 the company retained approximately half its profit for surplus and expansion, and distributed the balance to its associates, but looks forward to the immediate post-war period when larger dollar net profits may permit larger percentage distribution of its profits.

In the eyes of management its profit-sharing plan is not a substitute for equitable compensation and regular employment. Wage scales are maintained at the level of the surrounding industrial area. In 1933, even before the NRA attempted to influence hours-and-wages conditions, the company voluntarily reduced its work week from 48 to 40 hours, with a proportionate increase in pay rate. All workers are paid, too, for seven holidays.

Profits Are Divided

The formula for division of profits at PMC is difficult to prescribe. Its decision is strictly a function of management, which believes that any division of profits, to be truly equitable in a group performing many dissimilar duties, should be based upon careful consideration of all merit factors, such as pay rate, seniority, dependents, and special personal obligations; and should also constitute a special reward, for the operating period covered, for coopera-

In addition to indoor facilities for employee recreation in lunchroom, company program provides outdoor diversions in horseshoe pitching plots, a softball field, tennis court, and handball court

tion, initiative, skill, orderliness, safety-first habits, and any outstanding individual merit.

How has this profit-sharing program worked? Management is on record that it has become a vital, cooperative objective toward which all executives, technical, sales, clerical, and production departments continually strive. All workers voluntarily assume a wider scope of duties toward improvement of the product and greater productivity. Labor costs are favorable, with a minimum of supervision. In short, profit-sharing has proved to be sound business. This is the opinion of a management that has built up the business entirely out of profits, without a single bank loan (except for the temporary wartime magnesium division requirements) in a competitive industry from an original investment of $1500 some 23 years ago to a present real value of nearly $400,000.

But what happens when there may be little or no profit to share? Management contends that the good faith built up between the management and associates during the fat years is a bulwark against dissatisfaction over omission of profit dividends or even temporary reduction in earnings in the lean years. Those accustomed to cooperative sharing in profits, it says, are more prone to share cheerfully in inevitable occasional losses, and ordinarily are financially secure against distress.

Next in order of long-range attractiveness to employees is the company's pension plan, in which all associates employed for three years are eligible to participate. The cost of this plan is borne entirely by the company. Of quite recent development, this plant provides for benefits, after retirement at 65 years of age, whereby the employee will have his regular Social Security (old age) benefits augmented considerably. The employee will receive an additional pension from this plan in amount at least equal to, or even up to as high as 2½ times, the government's payments, depending upon age at start of employment and pay rate.

During active employment there is fine opportunity, too, for physical rest and mental refreshment as provided by the company's vacation plan. The following schedule applies to all employees:

Length of Service	Vacation Weeks	Vacation Pay
Over 1 year	2	3 weeks
Over 5 years	3	5 weeks
Over 10 years	4	6 weeks

The extra pay is given mainly on the theory that extra pocket money enables the worker literally to spend a good vacation away from home and get a change of environment that reflects in better work after his return.

The graduations have been made in steps, moreover, that are within reach of all, and are without long discouraging intervals that might mar the reality of the plan.

Employee Benefits

This company seems to have a habit of going one step further in its personnel program long before many progressive plants have done even less for their employees. For instance, every associate who completes 6 months of service is insured at no cost to himself by the company's group plan for death, dismemberment, accident, and sickness benefits. The principal sum varies from $1000 for shop and clerical employees to $2000 for executives. Weekly benefits are graduated from $10 to $20 for shop and clerical employees, with $25 for supervisors and $40 for executives.

Weekly accident and sickness benefits begin with the first and fourth days of disability respectively and extend for maximum 13-week periods. Accident benefits are limited to non-occupational accidents which do not come under the statutory provisions of workmen's compensation. There is no limit to the fre-

As a result of company's firm policy of advancement from the ranks, just about three-quarters of all the first-class machinists and welders now employed in the shop have risen from the bottom, where they began as helpers. Almost one-quarter of all present employees more than 10 years' service

quency of disabilities except for employees over 60 years of age, who can receive only a total of 13 weeks in any 12 consecutive months. So far this program represents nothing too unusual.

But the company goes further. Extra benefits are paid by the company to employees, according to length of service, in the event of accident and sickness disabilities, that bring their weekly income up to full 40 hours' pay. In sickness, for instance, associates employed over 1 year receive full pay for the waiting period of 4 days, plus the difference in weekly policy benefit and 40 hours' pay for the first 4 weeks. After 5 years' employment, this period is increased to 8 weeks; after 10 years, to 13 weeks.

A similar schedule applies to disabilities due to injury while at work, whereby the company pays the difference between the weekly compensation payments and 40 hours' pay.

Abuses in both these plans are minimized by important reservations made by the company. Where policy benefits exist, it retains the right to withhold the first 4 days' pay if it feels the employee does not merit this consideration. In questionable disabilities of only several days' duration, a doctor's certificate is accepted as evidence warranting the payment. In the case of compensable accidents, no employee injured while violating (in the opinion of the directors) any safety rules is eligible for payments over and above those he is entitled to under state law.

Recognition for Service

As a climax to these liberal provisions for employees' welfare in short-term emergencies, the directors consider any case that requires assistance beyond the stipulated periods, and take steps they feel deserved by the individual's record and standing with the company. Governing the administration of this whole financial pattern of employee welfare, it will be noted, is the incentive held out to the worker not only of recognition for long and faithful service, but also of reward for the kind of service, display of initiative, and degree of cooperation that is entirely up to the individual worker. In a word, it is an appeal in a newer way to development of the virtues of the free enterprise system which has made the company's success possible.

Let it not be concluded, however, that these various plans to assure reasonable financial security for its employees is the sole basis for attaining good employee relationships. Considerable emphasis also has been placed both on working conditions and recreational facilities.

Management is always ready to spend money where the need for improvement in working conditions is shown, because it believes it collects in the long run. In consequence, this is a healthful, clean, attractive plant with sanitary and service facilities on a par with the best of large plants. True, there is only a clean and pleasant combination lunchroom and playroom where employees gather to eat their own lunches, instead of a cafeteria, but most of them don't want hot meals. The point is, if they did, management would seriously consider providing them.

Joint committee, elected annually by employee ballot, supervises all employee activities. It meets biweekly to discuss changes

Recreational Facilities

For a plant as small as this, the recreational facilities and programs are developed to a high degree. Indoors, in the lunchroom, is a pool table and a shuffleboard, with lots of chairs around for men to relax and watch. Outdoors there are horseshoe pitching plots, and now in actual process of construction, where the magnesium powder plant formerly existed, there are a first-class regulation softball field, a tennis court, and a handball court. Immediately adjacent on a winding river bank, a picnic grove is being developed, with modern restroom facilities for women, children, and men.

As to recreational programs, six intraplant teams compete one evening a week in a nearby bowling alley. The teams are purposely intermixed with shop and office employees, also executives, to get evenly balanced performers. The company donates $150 annually toward prizes and a dinner, all other expenses are assumed by the men.

For the past nine years a company golf team has competed in the country league, and won three tournaments. This team is selected by a committee, called the "joint committee," which supervises and is responsible for all employees activties. It consists of five members, each selected annually by employee ballot to represent one of each of the five main departmental groups. These members in turn elect their own chairman, and meet monthly, or oftener if necessary, on company time, to perform their duties. Their plans are subject to approval of the directors. They arrange for company dinners, company picnics, fishing parties, and special entertainment for holidays and the like. Another of their functions is the consideration of employees' complaints, which whenever justified are brought to management with suggestions for elimination.

Picnic With Pay

Once a year the company gives an annual picnic to all employees and, if it falls on a regular working day, without loss of pay. Families of associates are invited, organized games held, and prizes distributed.

Then there is the Old Timers' Club, merely an informal way of recognition of length of service. Several glass-encased bulletin boards have been placed at the office entrance and around the plant listing the names of all employees in groups over 5, 10, 15, and 20 years'

SUGGESTION

TO
PULVERIZING MACHINERY COMPANY
SUMMIT, N. J.

File No._____
Award $_____

*Submitted by*_____ Date_____ 194__

SUBMIT ANYTHING THAT WILL STIMULATE OUR SPIRITUAL HAPPINESS OR MATERIAL PROSPERITY

Use separate blank for each suggestion — sign your name and date — suggestions must be your original idea — use sketches to illustrate your idea — awards will be made by company for suggestions it considers acceptable — supplementary award will be paid later on for any suggestion proving more valuable than originally appraised — your suggestion box contributions also will be weighed at profit-sharing time — not necessary to type, your own handwriting will do — use both sides of sheet if necessary.

MARK (x) ANY or ALL ITEMS listed below which you believe your suggestions will SAVE, IMPROVE, or STIMULATE:

☐ TIME	☐ MATERIAL	☐ SAFETY	☐ HEALTH	☐ COOPERATION	☐ BUILDINGS	☐ MACHINERY
☐ EQUIPMENT	☐ GROUNDS OR LANDSCAPE	☐ MATERIAL COMFORT	☐ SPIRITUAL COMFORT	☐ SOCIABILITY	☐ RECREATION	☐ EDUCATION
☐ PUBLIC RELATIONS	☐ RESEARCH	☐ MIKRO-PULVERIZER DESIGN	☐ SALES AND PUBLICITY	☐ SERVICE	☐ NEW PRODUCTS	☐ ANY ROUTINE OR PROCEDURE

I suggest the following for consideration:

_____

_____

Wording of suggestion form not only offers the worker a reward for an acceptable idea, but also promises added rewards should the idea later prove more valuable, plus special profit-sharing recognition

service. Upon reaching 10 years' service each employee is given a suitably engraved watch.

Other glass-encased bulletin boards, similarly distributed around the plant, list the names of members of various committees, beginning with the joint committee, and including the wire and safety committee, first aid committee, and "Sunshine Club."

For Personal Service

The company's Sunshine Club committee is chosen in the same manner as the joint committee, for the purpose of following up cases of illness or personal or family difficulties of any associates which seem to call for sympathetic and strictly personal treatment. Flowers, fruit baskets, and other kindnesses are paid for from a fund accumulated by monthly donations of 25 cents from each club member, instead of relying on the unsatisfactory scheme of "passing the hat." All associates are invited to join; those few who are reluctant to join understand that they receive no club benefits.

There are other activities contributing to the healthy status of employee relations at PMC, such as its suggestion system, which uses the blank form illustrated above. Suggestion systems are not new in industry, but in recently adopting this technique this management has concisely restated its desire to have employees share profits, and has shown its good faith by leaving the door open for higher awards, should added values be later demonstrated.

Along educational lines, the company enters a personal subscription to a well-known monthly digest for each employee of more than a year's service. All junior and senior executives receive a personal subscription to a leading business weekly magazine. Other technical, management, and trade periodicals are routed to selected associates. More important, the company encourages educational evening courses in engineering subjects, secretarial work, and in elementary studies or trades, the tuition and books at company expense.

Management is committed to a firm policy of advancement from the ranks. Practically every junior executive started with the company shortly after graduation from a technical college or after equivalent studies, and took the lengthy training course in the company's own research and test-grinding laboratories. In the shop, about three-fourths of the men who are now first-class machinists or welders began at the bottom as helpers.

More to Be Done

Despite these manifold policies and practices to obtain worker contentment and cooperation, hence high productive efficiency, this small company feels there is still more to be done. Present personnel techniques need to be polished and improved. New ones need to be added and are under consideration, such as routine medical examinations, and even possibly the part-time services of an industrial psychiatrist.

One thing is sure. There is no feeling here that, because the company is small, it cannot offer to its employees the same privileges and opportunities that many larger plants do. On the contrary, the company believes in exploring every new and valid approach to better employee relations, with the purpose to excel in their application and thereby assure its own growth and prosperity. The facts that have been presented here seem to bear that out.

Why Do Workers Stay Away?

E. WILLIAM NOLAND, Assistant Professor of Sociology, Cornell University, Ithaca, N. Y.

How WELL do you like your job, your shift? How fairly do your fellow-workers treat you? How well does your foreman treat you? Does he try out your suggestions? How good is the lighting where you work, the temperature? Do you think that promotions are made on the basis of merit? Is there needless shifting of workers from job to job? How important is your job? Do you hold up production when you are absent? How comfortable is your home? How pleasant is your neighborhood? Are your children receiving from you the attention they need? Do you have time outside working hours for the necessary chores at home? Do you find it difficult to get to the stores and the bank because of awkward hours? How often are you too ill to work? How much vacation do you need? How much absenteeism should workers be permitted without investigation?

These are only a few, but typical, of the scores of questions asked employees of Morse Chain Company, Ithaca, N. Y., in an attempt to associate their attitudes toward various spheres of living with their absenteeism records. Certain of these worker satisfactions and dissatisfactions, as well as certain factual data (such as age, education, and number of dependents), were found to be so significantly correlated with absenteeism that a rather clear-cut plan of attack seemed feasible.

Wide Coverage

The data were collected through interviews with scores of workers at the plant and complete coverage of the plant population by questionnaires. The questionnaires were fourteen pages long, and contained 86 questions, calling for 129 answers. Of the 861 questionnaires, 54 percent were returned. The representativeness of the sample was satisfactorily established, and the statistical techniques employed in the analysis of the data included the scaling method being used by the Research Division, Special Services Branch, Army Air Forces, of the War Department, and appropriate multiple correlation and regression methods.

Items that answered questions concerning the workers' *satisfaction with job* were, taken collectively, most closely associated with absenteeism. The most promising of these items as points of attack on the problem were (1) degree of satisfaction with job; (2) extent of being bothered by varying work; and (3) fairness and kindliness of treatment by fellow-workers. Absenteeism records showed significant improvement as one moved from those workers who expressed dissatisfaction with job along the continuum to complete satisfaction; those who were bothered by varying work had the poorest absenteeism records; and the "regulars" in attendance at work indicated a much greater awareness than others of being treated fairly and kindly by fellow-workers.

The workers' opinions regarding the *efficiency of management* came next in degree of association with absenteeism records. The most important considerations here turned out to be (1) foreman's display of appreciation of good work; and (2) needless shifting of workers from job to job.

The attitudes of workers toward out-of-shop "influences" were given their share of time and questionnaire space in the investigation also. For example, *home situation*, the fourth-ranking area, pointed up how the attitudes of workers toward being able to work at the plant regularly were affected by (1) the care children get at home; (2) time for necessary chores at home; and (3) comfort of residence.

The workers' attitude toward absenteeism was measured also, with the result that those who had the best attendance records were the ones who (1) recognized the importance of their jobs to the point where they felt that

Attitudinal Areas and Absenteeism

Name of Area	Most Promising Items in Area
I. Satisfaction With Job	1. Expression of satisfaction with job 2. Extent of being bothered by varying work 3. Fairness and kindliness of treatment by fellow-workers
II. Efficiency of Management	1. Foreman's display of appreciation of good work 2. Needless shifting of workers
III. Attitude of Management	1. Opinion of worker concerning the attitude of management toward him. 2. Opinion of worker concerning the desire of management to make war profits 3. Utility of management's "take your time" policy for workers
IV. Home Situation	1. Care children get at home 2. Time for necessary chores at home 3. Comfort of residence
V. Comfort at Job	1. Adequacy of (a) lighting, (b) temperature, (c) ventilation, (d) restroom facilities 2. Tiresomeness of job
VI. Life Organization (Morale)	1. Worker's satisfaction with his friends 2. Worker's health as he sees it
VII. Attitude Toward Absenteeism	1. Worker's conception of the extent he holds up production when absent 2. Worker's opinion as to when he has the right to be absent 3. Worker's idea of the best way to handle the absentee
VIII. Community Situation	1. Ease of getting to stores, bank, etc. 2. Ease of finding ways to use leisure

they actually held up production when they were absent; (2) insisted on "hard-boiled" treatment of the absentee; and (3) had the smallest "excusable absences" category.

In short questions measuring the attitudes of industrial workers toward various spheres of living (e.g., their home life, various phases of their in-shop life, etc.) were found to group themselves into areas, which we shall call "attitudinal areas," each of which was significantly associated with absenteeism. These eight attitudinal areas, ranked according to their association with absenteeism, along with the most important items in each area (in order of promise), are shown on page 131.

As a deterrent to this type of industrial "delinquency," the proper alteration of these attitudes seems promising, especially in the light of the manpower shortage that existed when this study was made. Those who possess a full appreciation of the problems inherent in this type of situation may find the results of this investigation helpful not only in combating absenteeism but also in studying labor turnover.

While the critical reader may insist that there are certain biases operating here to overemphasize the importance of the in-shop areas (e.g., workers were interviewed at the plant, the questionnaires were distributed at the plant), there is nevertheless what appears to be quite a significant difference between the extent to which absenteeism is associated with them and to which it is associated with out-of-shop areas. The study, therefore, becomes more of a helpful instrument for pointing out what can be improved in the shop rather than what needs to be done in the home and community situations of the workers. Traditionally, management has felt that the plant was its especial domain, the place where it could make the greatest contributions to worker efficiency and well-being; the findings here seem to give management some justification for continuing that belief and a chance to profit therefrom.

Factual items, because they measure uncontroversial actuality rather than attitudes, probably have their greatest utility to management in *selecting* new workers or in making out a *retention* list, with an eye to having on hand those workers whose characteristics make for good absenteeism record.

Education appeared in first place among the eight factual considerations selected for comparison. The workers with the most formal education had the best absenteeism records.

Age came second in importance. The younger the workers, the better were their absenteeism records. This difference can be accounted for in a large measure by the higher incidence of disease and general illness among the older workers. Mean absenteeism for those over 30 was 3.299 days per month, while for those under 30 it was 3.055 days per month. The ratio here is approximately 108 to 100. Mean absenteeism due to illness for those over 30 was 0.839 days per month, compared with a corresponding figure of 0.744 days per month for those under 30. Here the ratio is 113 to 100. These facts seem to show, therefore, that while younger workers may be more desirable in the over-all picture of absenteeism, they may be less desirable if we eliminate the contribution of illness. Naturally, we cannot ignore illness. In general it contributes more to absenteeism than any other single factor. But all this serves to emphasize that perhaps remedial measures which have to do with illness should be directed more toward the old than the young, while work with certain other factors associated with absenteeism may call for a reversal of emphasis.

In short, the eight most promising factual items, in the order of their importance, are as follows:

1. Education
2. Age
3. Number of dependents
4. Similarity of present job to former jobs
5. Amount of vacation taken
6. Average length of former jobs
7. Average number of visits to doctor annually
8. Amount of work in addition to that at the plant

By way of pointing out the *direction* of the association of absenteeism with the last six of these factors, it should be mentioned that the workers with the best attendance records were those who (1) had the greater number of dependents; (2) had jobs most similar to earlier ones; (3) took the least self-chosen vacation (no regular vacation period was provided at this plant); (4) had held former jobs longer on the average; (5) made the fewest visits to the doctor; and (6) did the least amount of work outside the plant.

The four top-ranking attitudinal areas and the four top-ranking factual items were chosen for comparison, with these results (in order of importance):

1. Education
2. Satisfaction with job
3. Efficiency of management
4. Number of dependents
5. Similarity of present job to former jobs
6. Age
7. Attitude of management
8. Home situation

All this appears to point up the wisdom of choosing workers for regular attendance on the basis of *education* and *number of dependents*, and, once hired, of getting and keeping them *satisfied with their jobs*, and respectful and appreciative of the *efficiency of management*.

THE AMERICAN WAY

There is one way, and I believe only one way, by which we can hope for the standard of living to be improved. That is by greater production per man through increased efficiency of machinery and working methods and greater personal efficiency of the worker.

In this way more commodities, more cheaply produced, can be offered for sale at a price low enough to attract more and more buyers. This in turn will mean more employment, greater competition for the labor available, and higher wages for all.

Few leaders in public life and in labor circles realize that production—not wages in dollars and cents—determines the standard of living.

A. C. Streamer, Vice-President, Westinghouse Electric Corporation

MANAGEMENT SHORTS

Readers are invited to contribute brief aticles, illustrated when possible, reporting out-of-the-ordinary management accomplishments. Accepted articles will be paid for

It takes but a few seconds each to X-ray workers with unit specially built for handling large numbers of people with a minimum loss of time

TB Examinations on Production Line Basis

SOURCE: North American Philips Company, New York

Equipment that puts fact-finding about employee health on a production line basis is in use at McNulty Shipyard, Brooklyn. The mass-chest-radiography unit was especially developed to handle plant workers in large numbers, with minimum loss of time. Workers line up and are exposed one by one to the X-ray machine. The images are recorded on 70-mm. film, and electronic controls automatically regulate the time necessary for exposure.

•

Truck Driving Tests Insure Safe Operation

Operating a fork lift truck calls for training —otherwise dangerous practices and loss of manpower are likely to result. At the Naval Ordnance Materials Handling Laboratory, Hingham, Mass., truck operators not only take lessons, they also have to pass examinations in driving their trucks.

One of the problems posed in the examination is shown in the photograph. Known as the obstacle test, a loaded truck has to be driven forward and backward through the maze as the lines indicate. One point is deducted for each pallet displaced and one for each full stop made.

Other problems include carrying a loaded pallet down a 52-in. aisle; setting a loaded pallet from a 12-ft. aisle on a marked area perpendicular to the aisle; removing pallet loads of loose cases; stowing pallets in freight car and bringing them back to their original position; general truck operation.

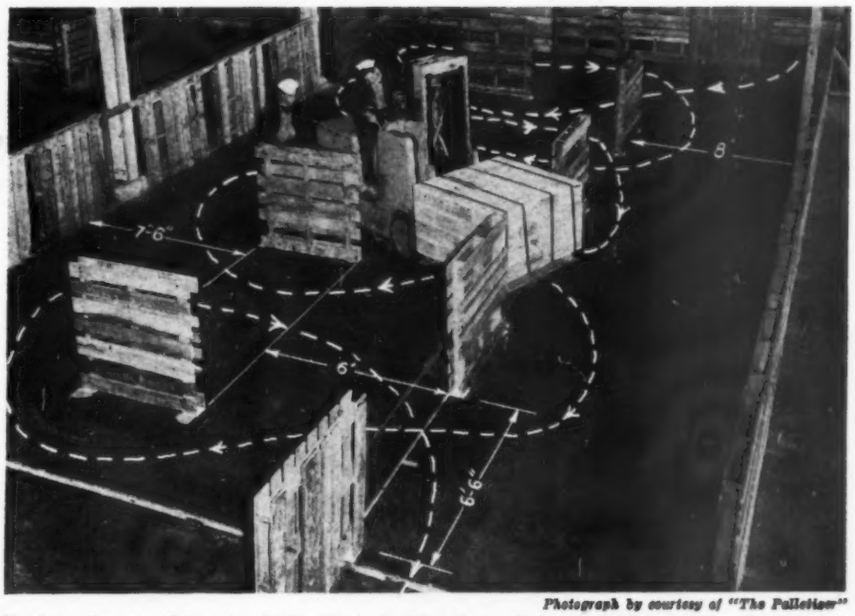
•

Veterans' Clubs Help Returned Servicemen

For the promotion of mutual assistance, veterans' clubs are making their appearance in many of the larger companies.

At National Automatic Tool Company, Richmond, Ind., for instance, membership in the Natco Veterans Club is open to all honorably discharged veterans of World War I or World War II. This was a spontaneous organization, with the veterans holding their own organization meeting, electing their own officers, and writing their own constitution. Membership costs $1 initiation fee, 50c monthly dues, and any veteran, whether previously employed by this company or not, is eligible. Two meetings, one business and one social, are held every month. Future plans include taking an active part in civic projects.

At Servel, Inc., Evansville, Ind., the Returned Veterans Club is an offshoot of the Servel War Dads. The projects committee of the latter organization aided in the organization of the veterans' group originally



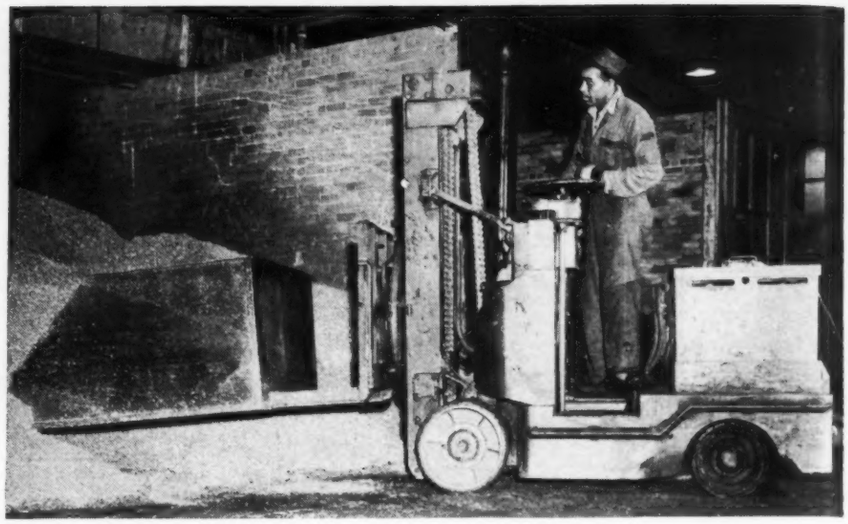
Photograph by courtesy of "The Palletizer"

Trainee has to drive truck forward and backward through the maze. One point is deducted for each pallet displaced, one for each full stop

as a social unit. It is now a part of the organized recreation program and functions in addition as a "self-service" organization. It keeps members posted on all the rights and privileges to which veterans are entitled. Officers of the Returned Veterans and the War Dads serve as liaison between existing veterans' agencies and all Servel employees who have been or are in some branch of the armed services.

An Ex-Servicemen's Club was organized at the Cleveland plant of Thompson Products Company in 1940. All members were veterans of World War I, and its purpose was social. As the war continued, this club found new usefulness. Members could help the newly discharged veterans to feel at home. Older members of the club, scattered throughout the plant, have supplemented the work of the personnel and supervisory staff. A comradeship has sprung up in the plant between newly returned veterans and those who have been back a long time, including veterans of World War I.

Objectives of the Veterans Club at Champion Paper & Fibre Company, Hamilton, Ohio, as set forth in the club's constitution, are the "preservation and furtherance of the interests of the war veteran. These interests shall include the re-establishment of the veteran in his rightful place in the civic community; to expedite and assist in the rehabilitation of the veteran by maintenance of employment services, sponsoring educational opportunities, and providing counsel for insurance, housing, recreation, and personal problems; advice and assistance with respect to government benefits and agencies; improvement in working conditions; assistance to disabled veterans; and the encouragement and promotion of all civic betterment."



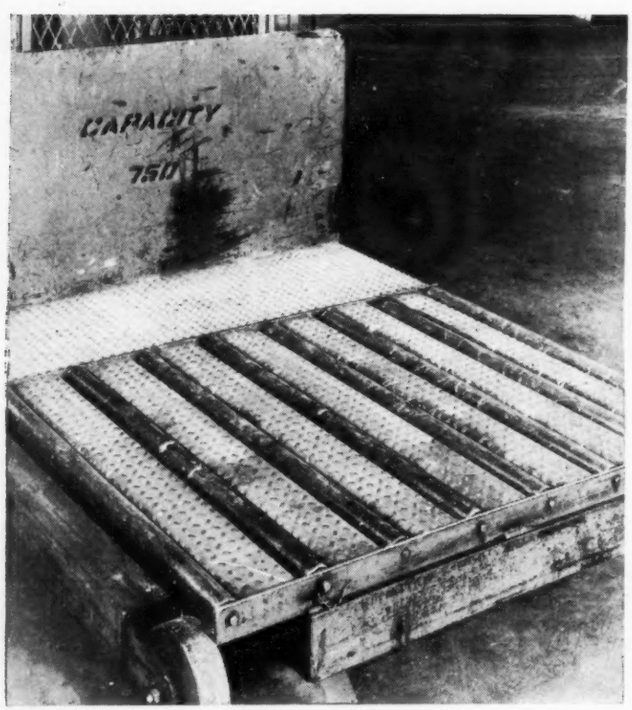
To handle metal chips at Packard Motor Car Company, Detroit, special dump buckets have been designed. Devised for use on a fork lift truck, buckets can pick up approximately 700 pounds from storage bins for loading. Bucket body has two sleeves at the rear, into which truck forks slide. These sleeves run through the bucket and are welded to the floor for additional support

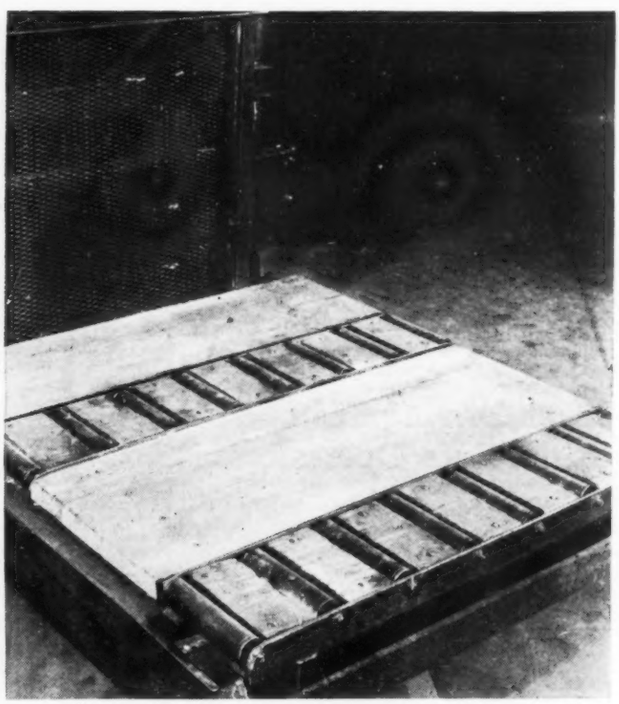
Stacker Platforms Made Safer

JOHN FORWITH, Electric Appliance Division, Westinghouse Electric Corporation, Mansfield, Ohio

The platforms of our stacking equipment did not afford adequate footing for operators, and were therefore particularly hazardous when stacking crated materials in piles four, five, and sometimes six high. The left-hand illustration shows how this hazard was caused by the narrowness of the steady plates between the platform rollers.

By insertion of an additional wood platform, and by substitution of wood strips, as shown in the right-hand illustration, a firmer footing has been provided, and our operators now have a greater sense of security when stacking large crates in high piles.





Not having enough footing on platforms of stacking equipment was especially hazardous when crated materials had to be stacked four, five, or six high. An additional wood platform and wood strips eliminated the dangers

MAINTENANCE SERVICES

The well-maintained plant is the high-production plant

SELECTION • INSTALLATION • INSPECTION • UPKEEP • ORGANIZATION

CONTENTS OF THIS SECTION

Editorals 136

Organized to Maintain Seven Plant Locations....*Daniel J. Buckley* 137

Quality Control With 2,000,000-Volt X-Ray Unit.....*G. A. Van Brunt* 141

Small Plant Services for Efficient Production.....*Carl G. Wyder* 145

Painting the Shop Without Interrupting Production.....*A. F. Foose* 150

Making Sure the Distribution System Is Adequate....*R. B. Steinmetz* 152

Lighting Equipment 156

Maintenance Shorts 164

What's New in Equipment..... 170

Catalog Service 348

MAINTENANCE CONTENTS OF THE TWO PRECEDING ISSUES

NOVEMBER

Planning Machine Moves.....*H. M. Bradley* 135

Standardized Factory Facilities.....*Robert MacLatchie* 139
(Plant Operation Library No. 90)

How to Maintain Electronic Controls.....*H. L. Palmer* 147

Inspection Plan Improves Plant Housekeeping....*V. McCabe* 150

Low-Cost Battery Charging.....*Walter E. Atchison* 155

Preventive Maintenance Cuts Downtime 87 Percent *J. F. Boyd* 156

Welding Equipment 160

Maintenance Shorts 164

Data Sheets: Causes of Defects When Welding Stainless Steels 168

What's New in Equipment..... 172

Catalog Service 314

DECEMBER

Maintenance Log Book Reduces Machine Outage *R. E. O'Donovan* 131

Maintaining Conveyors Exposed to Abrasive Dust *Clarence W. Daniels* 134

Wage Incentive Encourages Better Housekeeping *R. W. Gibbs and William G. Weeks* 136

How to Get the Most Out of Ball and Roller Bearings *(Plant Operation Library No. 92)....Arvid and Gunnar Palmgren* 141

Improvements, Not Repairs, Add to Plant Efficiency *R. D'Amato* 149

How to Install and Maintain Electronic Controls—Part 2 *H. L. Palmer* 152

Steel Floor Plates Resist Heavy Trucking Loads *J. A. Finneran* 155

Power Trucks, Cranes, and Auxiliary Equipment..... 156

Maintenance Shorts 160

Data Sheets: Equivalent Drill Sizes..... 164

What's New in Equipment..... 168

Catalog Service 350

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.

Director of Circulation:
Change my address on Factory Management and Maintenance

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

FACTORY MANAGEMENT AND MAINTENANCE
McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42nd STREET, NEW YORK 18, N. Y.

MAINTENANCE as the Editors See It

Bring the Stock of Spare Parts Up to Date

WITHIN A PERIOD OF WEEKS a large plant experienced several costly delays due to the absence of needed spare parts, despite a well-filled maintenance stockroom. To the new maintenance chief that situation did not make sense. He ordered an investigation, and the results confirmed his suspicions.

There were abundant stocks of supplies and parts that probably would never be needed—some of the equipment to which these parts belonged had long since been junked—but in many instances little, sometimes nothing, in the way of parts for important equipment now in operation.

Useless material was junked. A careful study was made of every important piece of equipment in the plant, and an adequate stock of the parts subject to wear or failure was ordered. Repair records were a great help.

If this instance of mismanagement seems unusual, there are undoubtedly many other plants in which similar, if less extreme, conditions exist. Spare parts were often difficult to obtain during the past few years. Nevertheless, the fact remains that spare parts stocks need closer watching than they often receive. Estimating the number of each kind of spare part to be carried requires sound knowledge and good judgment.

When old equipment is taken out of service, it is easy to forget to cull out its spare parts. It is almost as easy to forget to study all new machines and put in the proper parts, enough, but not too many, of them.

A properly selected stock of spare parts may represent only a few percent of the value of the equipment to which it belongs. But that investment is cheap insurance against production delays that can easily cost a great many dollars per hour.

It Is Time to Redefine the Maintenance Function

CRITICAL EXAMINATION of the maintenance function by both management and maintenance executives is now timely and very much in order. Industry is entering the first year of the new peacetime production. It has emerged from the days when getting out a certain volume of production necessarily had to take precedence over everything else—when extra costs could easily be justified, and all sorts of makeshifts had to be used to keep the wheels turning.

All costs must now be watched closely. Competition will become more, rather than less, keen. Plans must be made on a long-range basis. Excuse and need for makeshifts are fast disappearing.

If clear agreement on maintenance policies is now lacking, it is high time to remedy the situation. Precisely what is to be the function of maintenance in the operation of the plant? Is it to be regarded as a necessary evil that cannot be banished, but which should not be allowed to cost any more than can be helped? Or is maintenance to be recognized as performing services that are indispensable and constitute cheap insurance against greater costs?

There ought to be agreement on whether maintenance is to be preventive or reparative. That is, should emphasis be placed on preventing deterioration and failure as far as possible, or should maintenance be charged merely with patching things up after they break down?

Is the organization of the maintenance department to be clear cut, with definite responsibilities and corresponding authority? Or is it to be a homeless orphan whom nobody wants and can safely blame for everything that happens?

Is maintenance to be self-respecting and have an adequate bank account—in the form of a budget—of its own, or must it frequently go to the front office, hat in hand, and ask for a few dollars?

Now is a good time to thresh out the answers to these questions.

Time Spent in Training New Men Is Well Invested

HOW CAN NEW MEMBERS of the maintenance department most quickly be oriented and made ready to handle the work to which they will be assigned? Always present, that question is particularly insistent now. New men, both experienced and beginners, are coming in. Former members of the department are coming back, but they frequently will find that many changes have been made, new kinds of equipment put in, while they were away. They, too, may need some help in getting back into the groove.

Time-honored practice is, in the absence of a definite training program, to let a new man work for a while with an old hand. Or his foreman may be told to watch him carefully and give him whatever instruction or help he needs.

Both methods have their merits, but the results are not always satisfactory or fair to all concerned. Neither can, or should, be entirely done away with, but they can be made much more effective and certain if they are supplemented by carefully written instruction or standard practice sheets. Such instructions may be amplified to good advantage by a few hours of classroom work.

Really good maintenance men are a valuable asset. Any amount of time spent in developing them will be extremely well invested.

Organized to Maintain Seven Plant Locations

DANIEL J. BUCKLEY, Superintendent of Maintenance, Pollak Manufacturing Company
Arlington, N. J.

EFFICIENT MAINTENANCE of buildings and equipment in a community group of decentralized production plants depends more than anything else upon the tactics of organization. That is the firm belief of the Pollak Manufacturing Company, which operates seven manufacturing plants, plus eight warehouses for storage of stock, within a circle of 5-mile diameter centering at Arlington, N. J. This belief has resulted from its own experience of maintaining these plants, aggregating over 430,000 square feet in floor area, for the past five years. During that time the company has had to expand in the number of its locations from one manufacturing plant to the present seven, and also to make continual adjustments in the physical layouts at all these plants. The plan of maintenance organization at Pollak, however, is such that it is relatively unaffected by additions, or even subtractions, of any plant locations, or by other plant changes that ordinarily might upset the equilibrium of another differently although well-organized maintenance department.

Effective plant maintenance lowers unit product cost

A "Traveling Crew"

The key to the success of this company's maintenance plan is a simple one. Instead of carrying a complete maintenance corps at each plant to handle all possible jobs that might come up, the company maintains at each location a smaller "building" staff of men sufficient only to take care of routine requirements. Extra work, such as major breakdowns, machine installations, changes in layout, or new construction, is taken care of by a "traveling" crew of maintenance men. If necessary, men from the various "building" crews can be drawn on to help in an emergency at any one location.

Maintenance problems at Pollak are typical of those found in the metal-working industry. The products of manufacture are generally described as aeronautical and marine appliances, and involve operations using light, medium, and some heavy machinery, also power presses, driven by motors up to 50 horsepower. Almost 40 percent of the manufacturing personnel of 5000 employees is engaged in inspection work needed to insure products of high precision standards. Buildings are mostly single-story and of recent construction.

To maintain these plants, and to accommodate their equipment to the continually changing production demands, has required a total maintenance force,

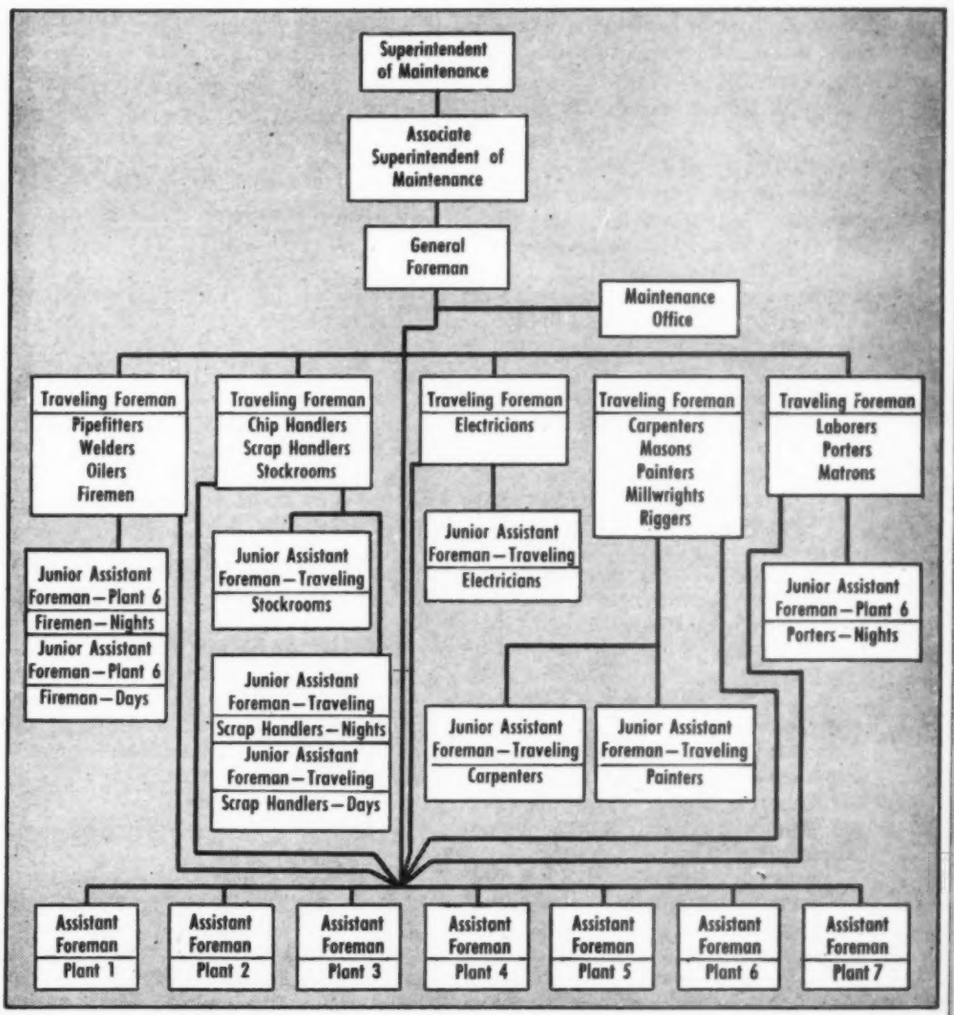


Figure 1. Organization chart for maintenance department serving seven manufacturing locations shows relationship of traveling foremen in charge of trade-skilled traveling crews to assistant foremen in charge of stationary crews at each plant

PROJECT REQUISITION

Description..... P. R. No.

..... Date .....

Equip. or Tool No..... Drawing No..... J. O. No.....

Account No..... Date Completed ..... Delivered to Dept....

MATERIAL — ORDER TO			LABOR							
DESCRIPTION	Quan.	Amt.	Date	Empl. No.	Hrs.	Amt.	Date	Empl. No.	Hrs.	Amt.

Total Material	
Total Labor	
Overhead	
Total Cost	
Authorized by..... Approved..	

PLANNING DEPT. POLLAK MANUFACTURING CO. DATE

REQUEST FOR PROJECT REQUISITION

Furnished by Plan. Dept. P. R. No.

Please issue Project Requisition for the following:	Part Name
	Used on Part No.
	Drwg. No.
	Drawing Furnished Yes No
	Required for New Work or Repair Job
	Equip. or Tool No.
	Charge To
	J. O. No.
	J. O. No.
When completed deliver to Dept. _____ Bldg. No. _____	J. O. No.

Approvals to start with originator of request

Asst. Foreman	Foreman	Asst. Supt.	Supt.	Further Approval

M & R

BLDG.	M&E	T&E	BELT	FF&F	OF&F	A&T

Routine of Order—Dept. Starting Work — Order to Be Sent to:

List Departments or Individuals Who Will Work on This Order:—

Figures 2a and 2b. All maintenance work costing over $10 requires a formal request to planning department, which secures cost estimate from maintenance office, and upon approval of management, issues a requisition

exclusive of supervisory employees, of about 270 men. Of this total, about 195 have been distributed over the seven locations as "building" crews, ranging from 11 men in the smallest building to 94 in the largest building. The balance of about 75 men comprise the "traveling" crew, which has its headquarters at the largest building (Plant 6), also considered the main location.

Line of Authority

The maintenance organization chart in Figure 1 shows the clear-cut line of authority of the supervisory personnel that contributes to the smooth functioning of this department. All supervisors from the superintendent of maintenance down through the five traveling foremen have their headquarters at the main plant. An assistant foreman is permanently located at each of the seven manufacturing buildings. The nine junior assistant foremen are engaged either in traveling functions or at permanent plant stations as each assignment may require. Not shown in the chart, for sake of clarity, are the numerous group leaders, who report to the foremen or assistant foremen, and who are in charge of the smaller working crews in the building or traveling groups respectively.

Each of the building maintenance crews is supervised by one of the seven assistant foremen. These assistant foremen have been selected for their general knowledge and all-round experience, with particular emphasis on ability to supervise electrical maintenance, which offers the biggest problem. In each building crew are men of various trades (electricians, millwrights, carpenters, pipefitters, chip men, porters, stockroom men) in the number and proportion needed for ordinary maintenance of each manufacturing building. Their work includes the responsibility for general maintenance, machine lubrication, housekeeping, and for making minor repairs.

Know Several Trades

Foremen in charge of traveling crews, however, are expert in the knowledge of one or several associated trades. They may be assigned to major jobs in any one of the company's buildings. In such event, the assistant foreman of that building is held responsible to the traveling foreman for any demands for help that the latter may make upon him.

Where a major job requires the use of several mechanical skills in one building, the traveling foreman representing the trade most involved in the job is placed in complete charge, and can draw on all traveling foremen of other trades for men as needed. Thus, the electrical foreman might be in charge of a project in one plant whereby he could draw on the millwright foreman for millwrights, while the reverse situation might exist simultaneously for another project in the same or a different plant. Moreover, the electrical foreman might subdivide his corps of electricians into several crews, under group leaders, each working under different projects at different locations. But no matter what the complexity of the requirements, the plan of organization prevents any confusion in their efficient execution.

Some question might be raised as to the necessity for setting up traveling foremen over the activities of chip han-

dling, scrap collection, stockrooms, and housekeeping. The organizational set-up has been extended to include these foremen, however, because although most of these working crews are situated at the plants where needed, and are under the supervision of each assistant foreman, certain advantages are gained by centralized control under a traveling foreman. He is able to coordinate these specific activities, and to institute standardized procedures that have been found most efficient. For instance, the advantages obtained in disposal of scrap under one head are self-evident.

Second only to the simple organizational relationships in obtaining the efficient dispatch of maintenance duties at Pollak, is the simple paperwork system for getting the work done. This system incorporates the desirable features of (1) prior approval over each major maintenance expenditure, (2) written order for work required, (3) approval of finished work, and (4) complete knowledge of what the job costs.

Without going into burdensome details, these features are obtained thus:

1. Approval of major expenditure. All work in excess of $10, including the cost of labor and materials, requires a "Request For Project Requisition" (Figure 2a), which is sent by the production superintendent of any of the seven plants to the company's central planning department. This request is issued in triplicate; white and blue copies are sent on, while yellow record copy is retained by requester. Planning department refers the request to the maintenance department for an estimate of cost.

Maintenance office is set up for quick estimate by two clerks experienced in keeping costs of all jobs. It returns estimated request to planning department, which secures management decision, and returns blue request to requester with notation of action taken.

2. Written order issued. After management approval of request, a "Project Requisition" (Figure 2b) is prepared and issued in quadruplicate by the planning department, which forwards a yellow copy to maintenance department. The pink copy goes to requester, white copy to accounting department, and blue copy is kept for planning records. Upon receipt of yellow copy, maintenance office types a work order (not shown) to whatever traveling foreman is to be responsible for the job. Frequently all the work can be done by a building crew, in which event the traveling foreman assigns the job to an assistant foreman for execution.

On receipt of work order, the foreman or assistant foreman plans the job, and issues stores requisitions for materials needed. On major jobs, whichever foreman is appointed boss of the job tells other foremen when and what help he needs. In the meantime, yellow copy of the project requisition is kept in a file (indexed by departments and buildings) in the maintenance office for executive scrutiny.

3. Approval of finished work. Upon completion of the job, the traveling foreman inspects workmanship, and then secures initialed approval of the production supervisor who requested the work. He removes yellow project requisition from maintenance file, attaches his own work order, and turns the two orders over to the maintenance clerk for preparation of cost.

4. Cost of job. Whenever the maintenance office prepares a work order (item 2) for a foreman, it also sets up a "project record," which is simply a special columnar sheet for entering date, clock number, and number of hours worked by all reporting time on that job. This record also provides a space for entry of both date and serial number of all materials requisitions applied to the job which are taken from duplicates received from the various maintenance stockrooms.

POLLAK MANUFACTURING COMPANY

ARLINGTON, NEW JERSEY

Request is hereby made for permission to move the equipment as listed. One item ONLY to be listed

NAME AND TYPE OF EQUIPMENT Brown and Sharpe #2 Grinder

POLLAK EQUIPMENT NUMBER 2609

"PKA" OR "PK" NUMBER

SERIAL NUMBER

TO BE MOVED FROM PLANT NO. 6 DEPT. 679 FLOOR 1 SECTION C-6

TO BE MOVED TO PLANT NO. 6 DEPT. 679 FLOOR 1 SECTION A-5

Foreman's Signature

DATE 7-21-45 Supt's. Signature

REASON FOR MOVE Better sequence of operations

PROJECT NO. X-209 DATE ISSUED 7-29-45 DATE COMPLETED

Figure 3. By prohibiting movement of any equipment without an approved move order, company insures accuracy and up-to-dateness of its inventory records and also eliminates any unjustified moves

Eliminates Errors

Upon receipt of the completed order from the traveling foreman, the maintenance clerk closes the "project record," attaches this record and supporting data to the two forms returned by the foreman, and refers the collection back to him for final checking. This routine has been found desirable to eliminate errors sometimes caused by wrong numbers on time cards or requisitions. When the foreman is satisfied that time and material charges are correct, he signs the work order and returns it to the maintenance clerk, who then removes all work papers from the yellow project requisition, enters completion date thereon, and forwards it to the planning and cost departments for final disposition. Work sheets retained in the maintenance office are filed for reference in checking costs and making future estimates.

It might be said here that all time cards for the employees of the maintenance department, including building crews, porters, laborers, and matrons,

Plant No. 6 — Supervisors Call Sheet — Date: 7/21/45

Time	Dept.	Trouble	Worker	Completed	Remarks
8 36	636	Blown fuse Machine 302	Jones	9 02	
9 05	Cafeteria	Leaking water cooler	Stevens	9 25	
9 10	622	Machine 621 Repair belt	Terrace	9 30	Belt beyond repair Replaced same
9 15	646	Check oil pump on #205	Cooper	9 45	

Figure 4. A record is kept by each maintenance supervisor of all requests for small jobs not covered by written orders, to prevent duplication of assignments, and to reveal trends to central maintenance office

are sent to the maintenance office for checking, analysis, and preparation of periodic "activity" reports.

Adherence to one other important technique to supplement the maintenance order system has been found worth while. No piece of production machinery or auxiliary equipment may be moved without a move order. This move order (Figure 3) is initiated by the requester in triplicate; white and pink copies are sent to planning department, the yellow copy is retained by requester. Estimate of cost is obtained from the maintenance department, and if the move is approved by management, the pink copy is attached by planning department to a project requisition (when cost is over $10), and sent to the maintenance office. When the job is done, the pink copy of move order is returned to the planning department for final disposition.

Complete History

The purpose of this move order is twofold. Its principal use is to record all changes in location of equipment, so that the machine inventory will always be correct and up to the minute. This inventory comprises over 5000 individual machine records, and shows history and specifications of each machine from the date of purchase to date of disposition. Identical sets of inventory records are kept in the accounting, planning, and maintenance departments. Whenever a completed pink move order clears through these departments, the machine record is corrected.

The second purpose of the move order is to eliminate unjustified machine moves. What might appear to the production superintendent who requests the move as only an inexpensive alteration, frequently requires other machine moves and alterations involving a high cost that does not justify the desired move. Also, the planning department thereby retains proper control over one of its important functions.

For Small Jobs

It has already been shown how maintenance expenditures of more than $10 are reasonably controlled. But jobs under that amount occur frequently, and must be handled promptly with a minimum of red tape. For all work requiring no written project requisitions, which incidentally, means it usually can be handled by a member of the building staff, a supervisor's daily call sheet is furnished to assistant foremen and their group leaders.

Entries are made on this call sheet (Figure 4) whenever telephone calls or requests are made from the production floor for small jobs. The supervisor receiving the call records name of worker assigned to job and, later, the time when job is completed. Occasionally such a call develops a need for a project requisition, which is noted in the "remarks" column.

The call sheet has been found of value in several ways. It prevents duplication, because with this record before him, a supervisor or group leader is not likely to make the mistake of sending two men out on the same job. The completed sheets are sent regularly to the central maintenance office, where they are scrutinized to see what kind of work is being done, and then filed for reference. If, for instance, a series of call sheets over a period of time shows a group of fuses blowing continually on one particular feeder group, it is an indication that a further investigation of the cause should be made, and corrective measures instituted. Likewise, the call sheets may show repetitive incidents revealing undesirable trends that need attention.

From its experience with the direction and operation of maintenance activities in its seven plants under one centralized head, Pollak believes it is doing every bit as efficient a maintenance job as would be possible under a single roof. This conviction is contributing to the company's plans to continue post-war manufacturing in as many of its present decentralized locations as production demands make possible.

Quality Control With 2,000,000-Volt X-Ray Unit

G. A. VAN BRUNT, Associate Editor, *Factory*

SHOWN IN THE FOLLOWING PAGES is one of four existing 2,000,000-volt industrial X-ray equipments, whose peacetime applications may well equal in importance the use to which it was put in ordnance manufacture, at the government ordnance plant, Elwood, Ill. Here this X-ray equipment aided in the quality control of bombs and a new type of shell.

The installation consists of the X-ray unit, which is suspended in the center of a turntable or circular conveyor that carries the parts to be inspected. The long X-ray tube is mounted in the center of a low-frequency, resonance transformer. This assembly is enclosed in a steel tank 8 feet long and 5 feet in diameter. The tank contains freon gas under 60 pounds per square inch pressure, which serves the purpose of electrical insulation.

Additional Equipment

Auxiliary equipment includes a compressing and condensing unit to remove the freon gas when replacing the X-ray tube, plus a water system for cooling the target of the tube and the freon gas. This system is an integral combination of two radiators, a fan, two motors, water pump, air filter, and pressure relays. Purpose of the pressure relays is to prevent operation of the tube if the water pressure rises above or falls below certain limits.

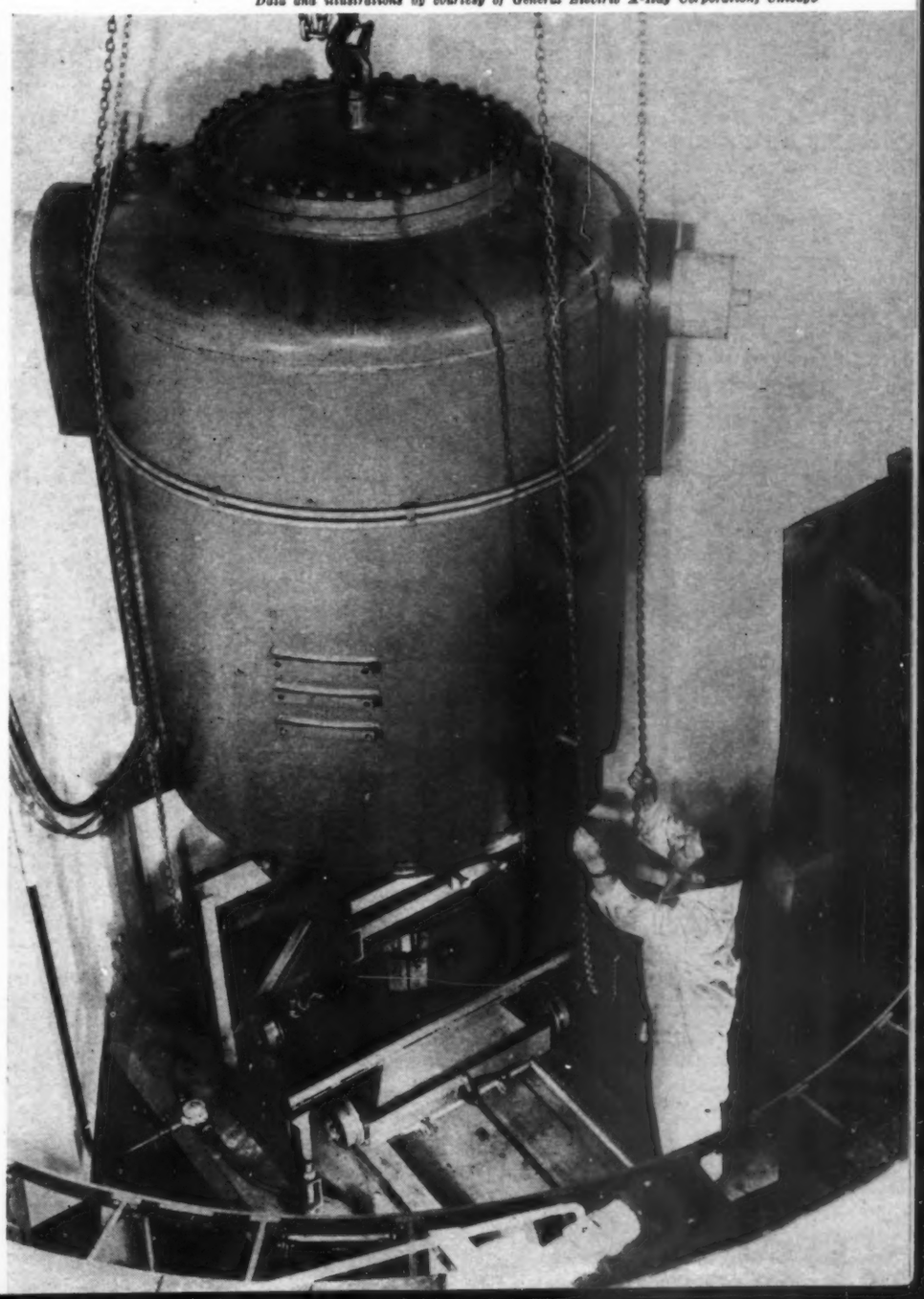
Energy for operating the tube is supplied by a 180-cycle alternator which is driven by a 220-volt, three-phase 60-cycle synchronous motor. The exciter for the motor also supplies direct current for the focusing coil and other equipment. Voltage applied to the high-tension transformer is controlled by regulating the field current of the exciter for the 180-cycle alternator.

In the installation of this equipment extensive precautions were taken to protect personnel and the apparatus from injury. For example, a lead shield was placed behind the films that record the results of the X-ray examination, and in front of a concrete inner-wall. This shielding forms a half-circle 16 feet in diameter, 6 feet high, and ½ inch thick. It protects the area outside from the primary radiation; and reduces scattered radiation to a minimum.

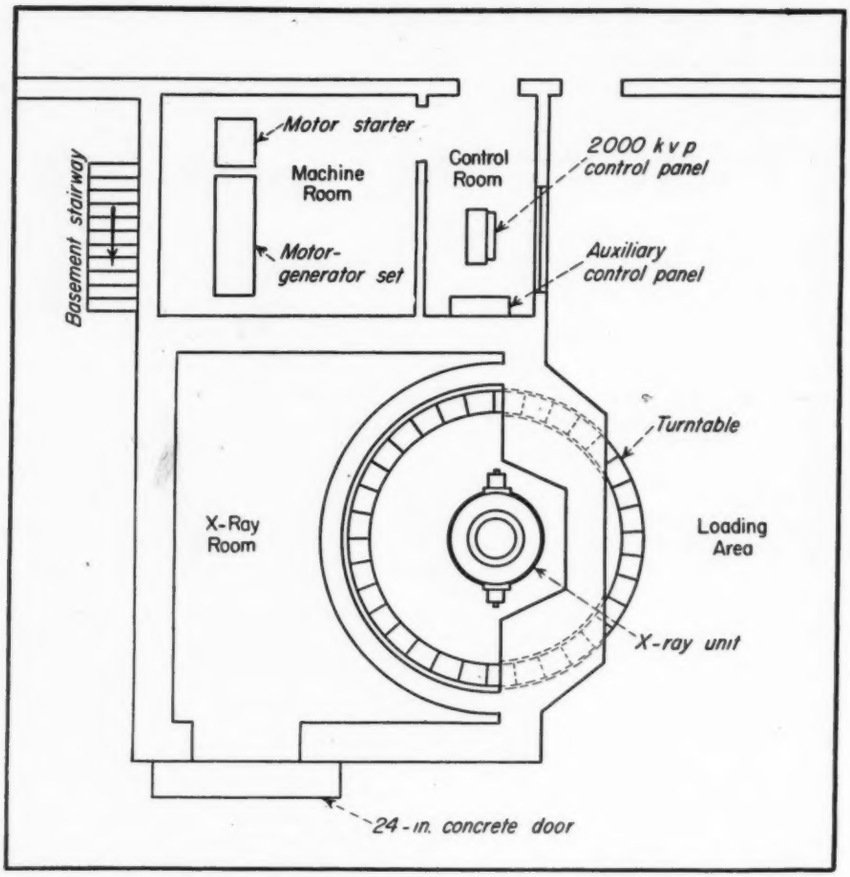
Supplementing this basic protection to personnel are the 24-in. thick concrete floor and walls, and a 12-in. thick lead shutter to stop the transmitted beam when radiographic work is not being done in the basement.

This lead shutter was necessary be-

Data and illustrations by courtesy of General Electric X-Ray Corporation, Chicago



The 2,000,000-volt X-ray tube and transformer are housed in a steel tank 8 feet long, 5 feet in diameter. Here the unit is being put in place



Floor plan of installation. Turntable carried shells and photographic film around X-ray unit

cause the portion of the X-ray beam reflected from the anode of the tube was used for radiography of shells and bombs carried around on the ring conveyor, whereas the beam transmitted through the anode was used to examine larger bombs in the basement.

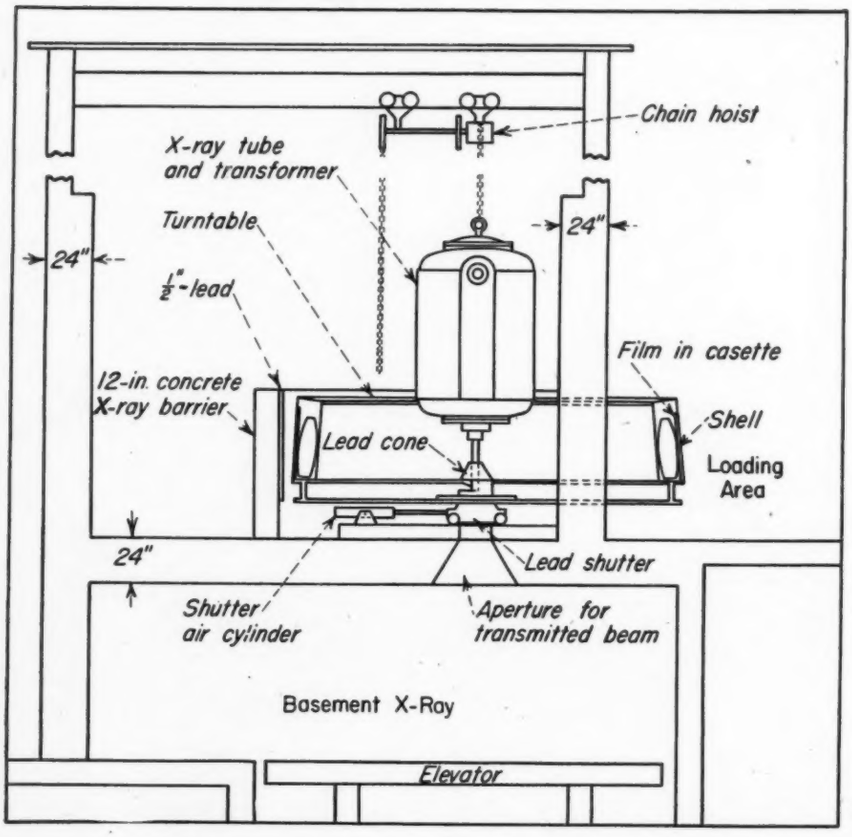
In addition there is a warning bell that sounds in the X-ray room, when the unit is about to be operated. If someone has been caught inside it is necessary merely to press a convenient button in order to interrupt the circuit and sound an alarm.

The 24-in.-thick door to the X-ray room contains 29,700 pounds of concrete and 800 pounds of mechanism, hence weighs nearly 16 tons. This door must be closed by a hand crank, thus obviating the possibility that the mere pressing of a button could accidentally seal a person in the X-ray room, or operate the door while personnel was in the way.

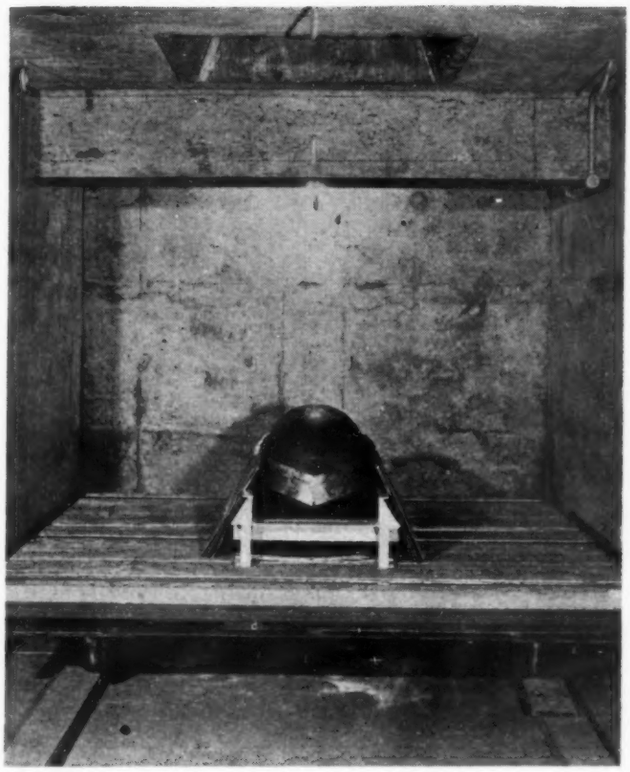
As will be seen from one of the accompanying diagrams, the electrical system is so thoroughly interlocked and otherwise protected that it is impossible to produce X-radiation until all necessary conditions have been satisfied.

For example, some of these conditions are: The surge tripper must be de-energized (automatically accomplished by depressing the X-ray On button) before voltage can be applied to the primary of the transformer. The switch on the timer must be in the ON position. Both freon cooler relays must be closed—possible only when both cooler motors are running. The d.c. voltage supply must be on, so that the d.c. voltage relay is closed. The freon pressure relay must be closed. Its coil is energized through the pressure control on the tube head, which is normally closed at 60, open at 55 pounds per square inch.

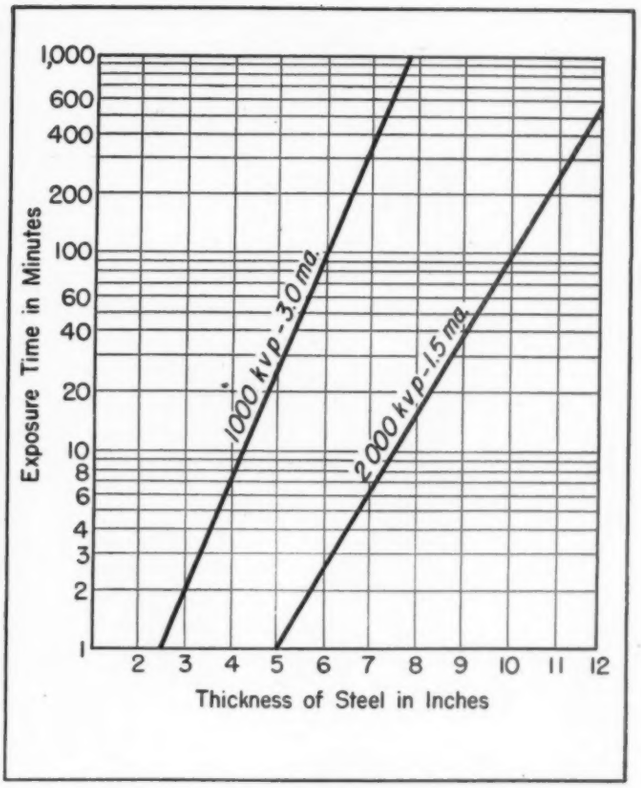
The focusing coil relay must be closed before the circuit is complete. Also, the kvp.ma. relay must be closed. The water relay must be closed. (If water pressure falls below 25 pounds per square inch at the cooler outlet, the low-pressure control opens, de-energizing the water relay and causing the X-ray to be turned off.) Before the circuit is closed, the kvp. control must be turned to Low, at which point the kvp. start interlock is closed.



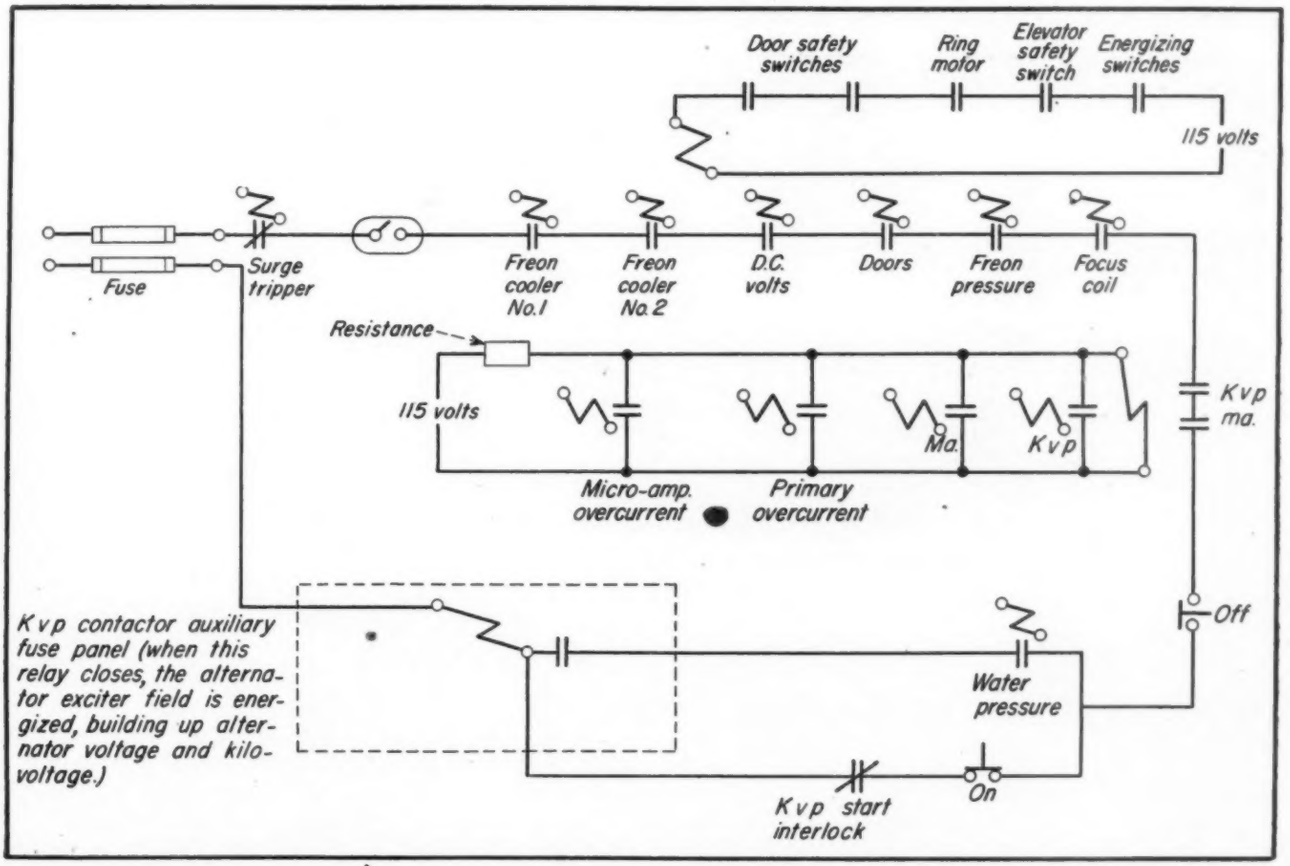
This shows the relative positions of the X-ray unit, turntable, basement X-ray room, and elevator



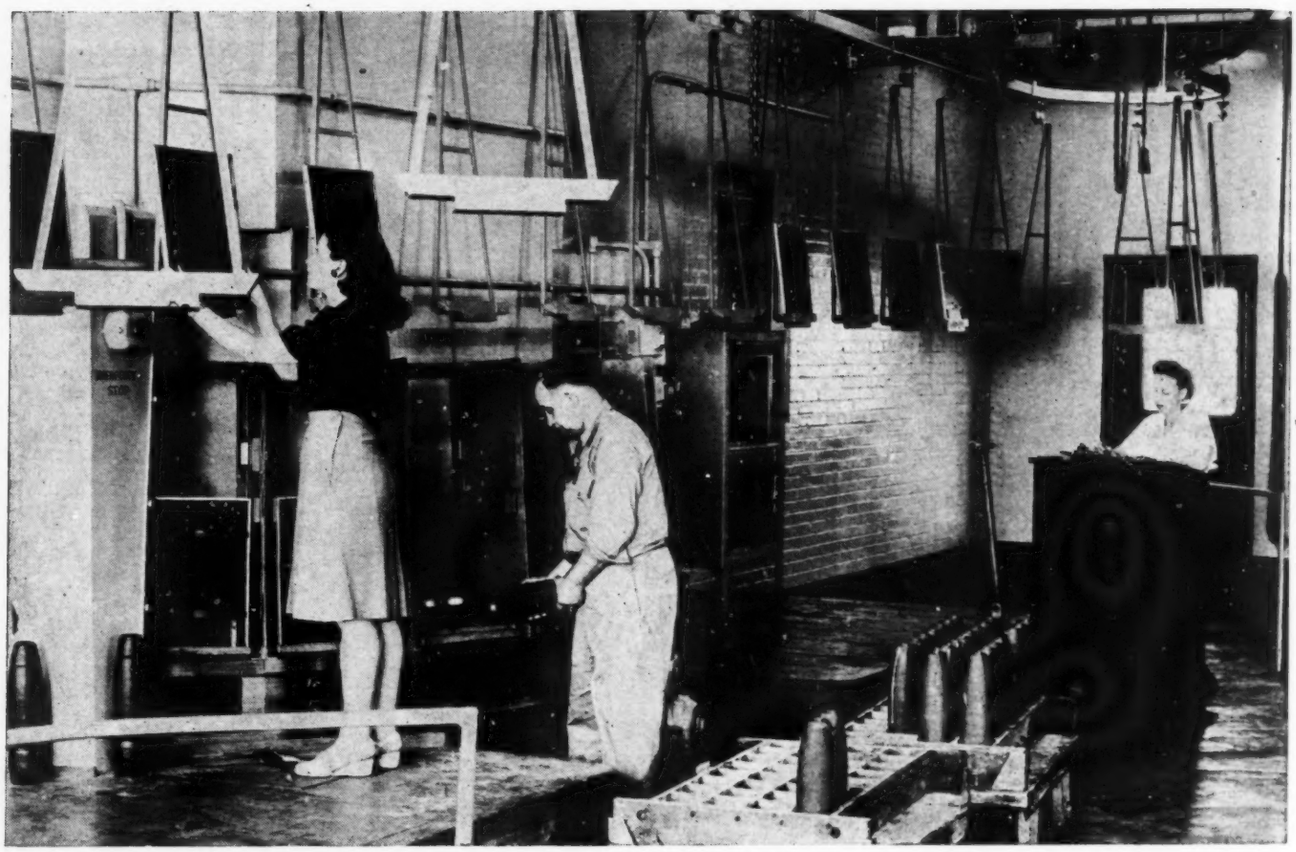
Here a 1000-lb bomb, properly masked, is ready for X-raying in the basement, using the transmitted beam



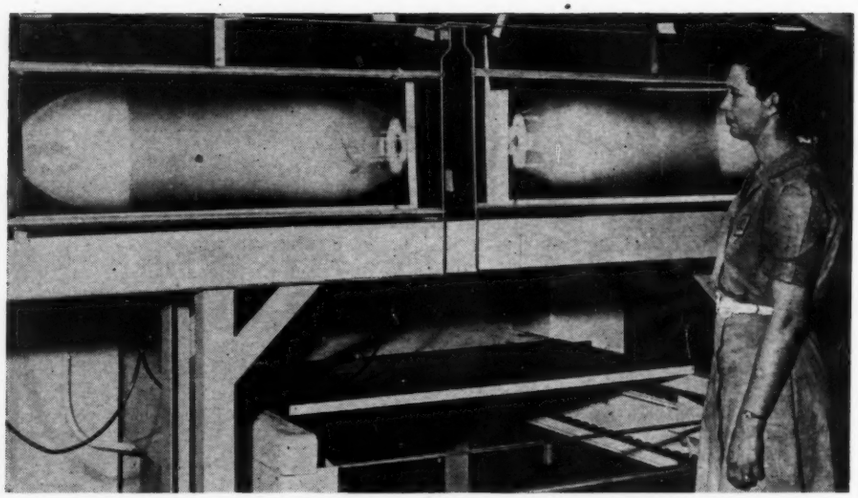
Radiographic speeds of 2,000,000- and 1,000,000-volt X-ray units, at 48-in. FF distance, A film, 15 density



Many protective devices, series connected, insure safe operation of unit and full protection for personnel



Loading area of the 2,000,000-volt unit is like that of the 1,000,000-volt, shown here, but on a larger scale



These are actual radiographs of 250-lb. bombs, on the viewer. Most films were viewed while wet. Only a small proportion were dried and saved

With all interlocks in proper position, the kvp. control relay is closed when the X-ray On button is pressed. This relay applies voltage to the field of the alternator exciter, and, therefore, puts voltage on the transformer primary.

A kilovolt control switch remotely controls the field rheostat of the exciter for the 180-cycle alternator to allow the operator to raise the voltage on the tube gradually and continuously from a minimum predetermined level to full operating potential. This control is interconnected with the X-ray switch so that the field rheostat must be in a predetermined position before the X-ray relay can be closed.

As would be expected, the 2,000,000-volt X-ray beam has much greater penetration than one produced by the 1,000,000-volt outfit that also was installed at Elwood, and therefore offers considerable advantage in exposure time and film latitude. For example, on 8 inches of steel the 2,000,000-volt beam is 100 times faster than the other.

An index by which the 1,000,000- and 2,000,000-volt units may be compared is by the half-value-layer yardstick, that is, the amount of lead or other substance that must be interposed in the path of the beam to reduce it to half its original value. Whereas the smaller unit has a half-value-layer of 3.3 millimeters of lead, the larger has a half-value-layer of 10 millimeters.

In operation, shells and films were put on the constantly moving turntable in the loading area, which comprises the portion of the table that is outside the X-ray room. The time required for the turntable to traverse the interior of the room determines the exposure.

As they emerged from the X-ray room, the exposed film cassettes were removed and identified as having been exposed. Shells were likewise identified.

In the darkroom the exposed films were put into hangettes and hung on the conveyor of an automatic film developing unit. On this conveyor the films were moved from one solution to another, washed, and carried into the viewing room.

Small-Plant Services for Efficient Production

CARL G. WYDER, Associate Editor, *Factory*

Editor's note: This is the second of two articles in this issue describing techniques used by a small plant to insure low-cost operation. Turn to page 126 for "Small-Plant Program for Good Employee Relations"

CAN THE SMALL INDUSTRIAL PLANT compete with the large plant in the provision of auxiliary production equipment to obtain high worker efficiency? Can it provide plant service equipment on a par with that of a large plant to attain equally attractive working conditions? These are pertinent questions in a time when all industry is striving for lower unit costs and higher production, and must also provide a workplace that will keep its employees satisfied and happy.

A look at the plant and facilities of the Pulverizing Machinery Company, Summit, N. J., says that it can be done. In fact, the PMC management insists that a small plant can do just as good a job—if not a better job—in these respects as a large plant, and at lower cost. It contends that there are fewer artificial handicaps to overcome, as created by factors such as plant size, distances to be covered, and number of personnel.

Room for Growth

Take the setting of the plant, for instance. The PMC plant, employing 100-odd people, is located on a landscaped portion of 5 acres of ground bordering the scenic headwaters of the Passaic River in a wooded section of a suburban town. Tax rates for homes and industrial sites are not exorbitant, and there is plenty of room for expansion. Employees are within walking or short riding distance from the plant. Other many important manufacturing considerations of plant location being equal, there is no question as to the unusual external attractiveness to employees in the location of the plant.

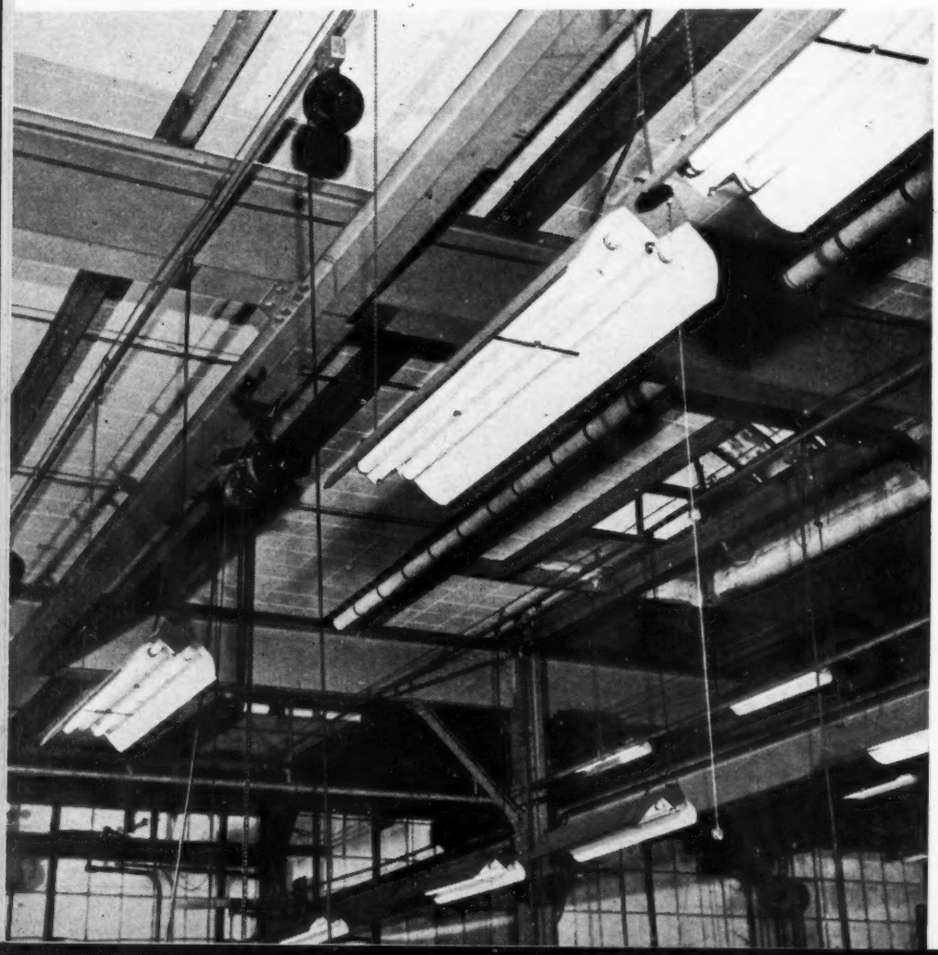
As to the chief features of the plant itself, it consists of a single-story, brick-and-steel main building substantially of rectangular shape, 195 feet long by 95 feet wide, a 60x100-ft. shop extension now under construction, and several smaller contiguous wings or isolated buildings around it. Total floor area of the plant is about 40,000 square feet.

At one end of the main building there is a second floor, about 40 feet wide,

Location of Pulverizing Machinery Company's plant on landscaped portion of a suburban town, within easy walking or short riding distance from employees' homes, makes it attractive to desirable workers

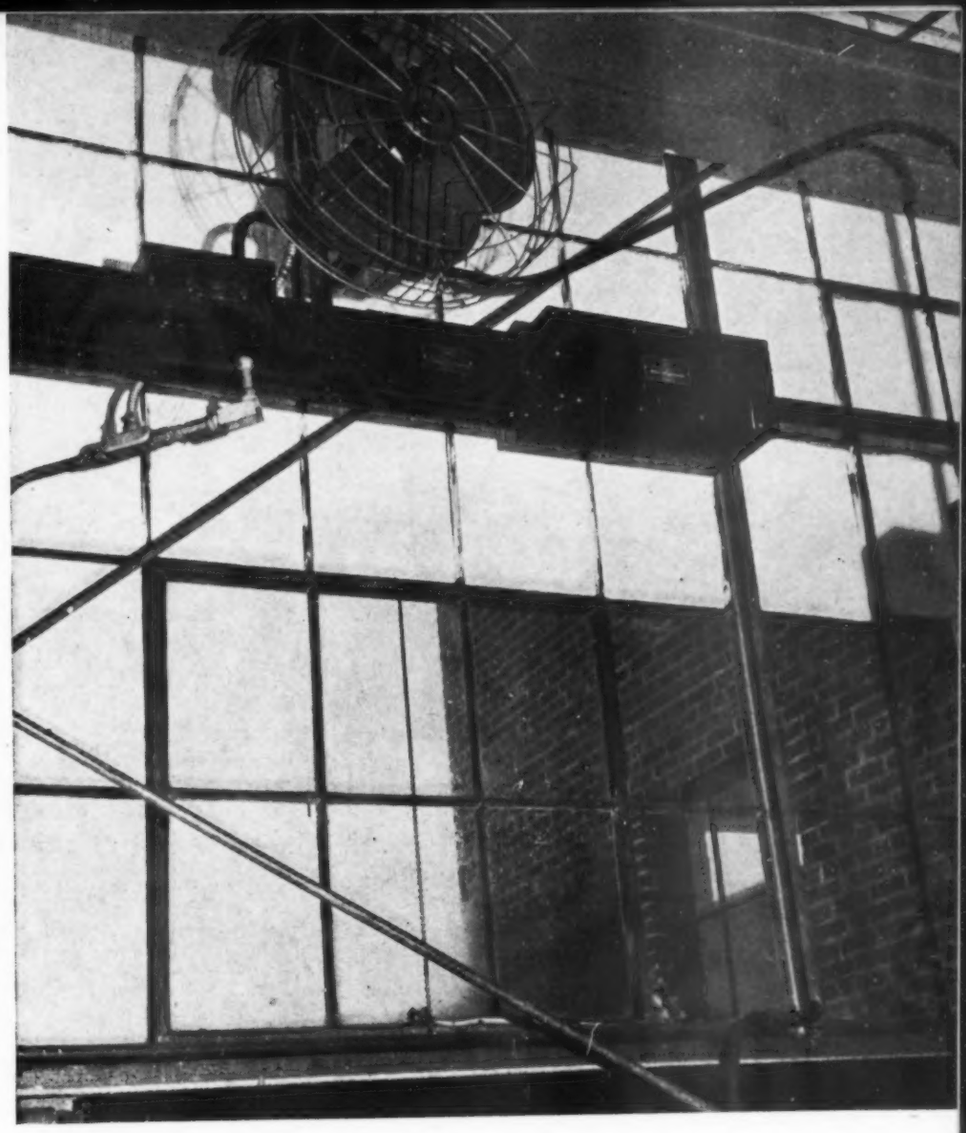
In girls' restroom modern conveniences provide for their comfort and refreshment

Overhead view in shop shows noise-conditioned ceiling, movable extension reels, movable fluorescent lighting fixtures, monorail with electric chain hoist, and ventilating fan in skylight



running the entire width of the building, which is devoted to office space and laboratories. The first-floor portion underneath the office is used for stockrooms, recreation room, shop locker room, and other service facilities. The remaining portion of the main building, of high-ceiling construction, is used for the shop. Floor is of concrete. Entire roof is of the flat concrete-slab type, supported on steel girders which have a floor clearance in the shop of about 15 feet. This provides ample clearance for all machine-shop operations that take place in the manufacture of parts and in assembly of the company's products, which are dustless pulverizing machines from ¼ ton to 3 tons in assembled weight.

Other details of building design are modern in their application. A run of continuous steel sash of the ventilating type encircles the entire building, including the office section. In the shop the sash extends from a 5-ft. level almost to the ceiling, giving considerable natural illumination and ventilation. Ceilings are soundproofed. Floors are wood block for foot comfort and noise abatement. Skylight ventilators in the shop roof help in this function. Fluorescent



Located just below window sill, fin-type steam-pipe keeps cold drafts away from shop workers. At top, one of the numerous fans that draw in outside cooler air in summer. Below fan is section of electrical distribution duct system that provides flexible power layout

lighting is employed liberally, both in shop and office, to bring lighting intensities up to efficient levels.

The entire main building is heated by a steam-vapor vacuum system, employing a stoker-fired furnace which is thermostatically controlled. The latest finned-pipe type radiation, supplemented by ceiling-type unit heaters, is used in the shop, with concealed cast-iron radiation for heating the office. In short, every normal facility for worker comfort has been provided to make this plant comfortable, clean, safe, healthful, and attractive.

But it is not until one explores the details of these facilities in this small plant that he can appreciate the extent to which management has gone beyond the minimum provisions to insure the best working conditions for its employees. As to function, these facilities are generally divisible into those that contribute to better surroundings and those used to make the job easier. In either event, they all finally add up to a better product at lower cost.

Here, in brief, are the extra touches, some recognizable as large-plant features, and some less familiar to many plants, that are making PMC a good place to work in:

1. Parking lot. A level, gravel-surfaced parking space that will comfortably hold about 80 cars immediately adjoins the plant. Employees experience no trouble getting in or out, hence no lost time or marred tempers to begin or end the day with. Incidentally, visitors profit from this convenience, too.

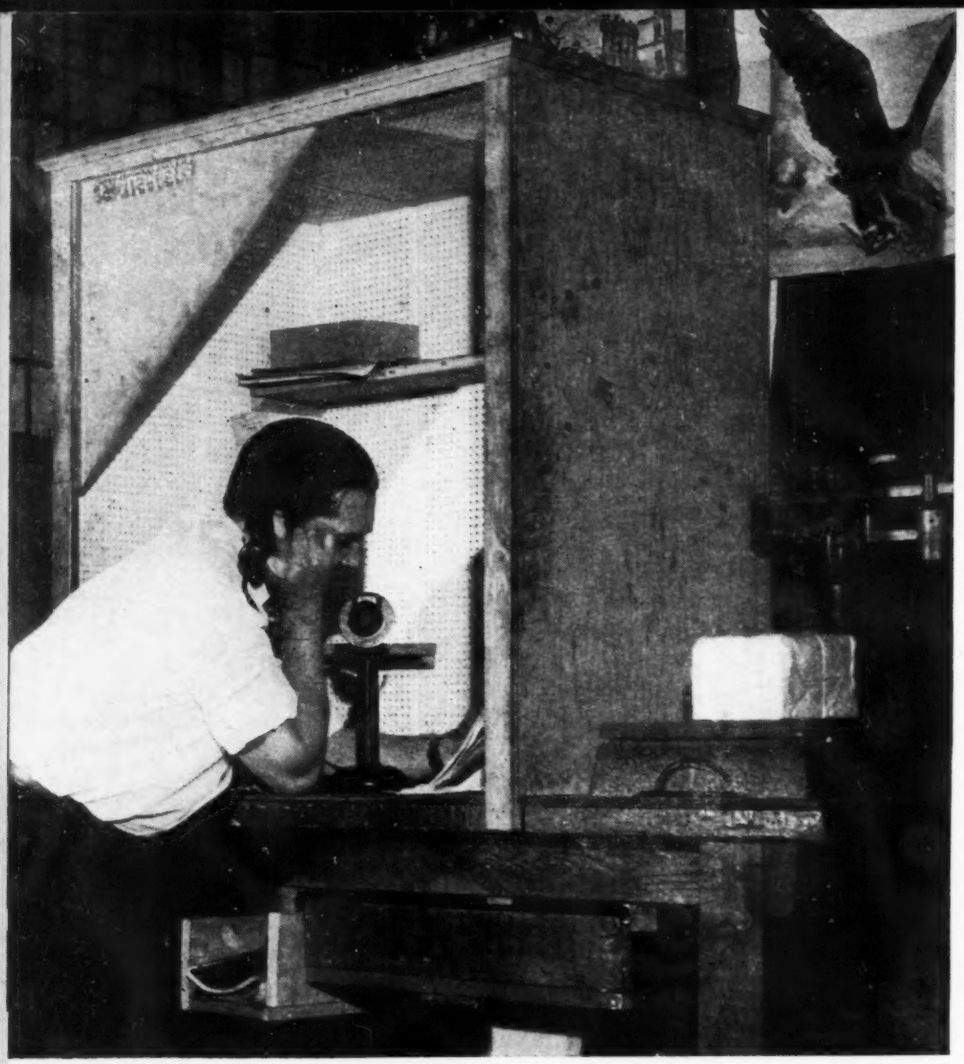
2. Locker and washroom facilities. For the shop personnel there is a locker room on the first floor, next to the shop, containing all equipment possibly needed for clothes storage and sanitation. Every man has his own steel locker in one of the groups lined along several sides of the room. Lockers are mounted on a slightly elevated concrete platform that has a cove-molded base flush to front of locker. Floor is asphalt tile, and walls are porcelain tile. No refuse can accumulate under lockers, and cleaning of floor and walls is an easy job. Low benches seating three or four people placed in front of all lockers make clothing changes easier.

Overhead, a thermostatically controlled unit heater keeps the locker-room temperature at a level suitable for disrobing and washing. A wall-type exhaust fan keeps the air fresh. For washing, there are three circular, mottled-stone washfountains in center of room, and in one corner a large tiled shower stall with ten spray heads. Washfountains are equipped with special soap containers for high-quality powdered soap. Clogging of drains by soap cake remnants is thereby eliminated, and the men respond to the hygienic appeal of a soap that really does a job of cleaning their hands.

Locker room, which is only about 40 feet square, is well lighted by nine 2-lamp, 40-watt fluorescent fixtures, and is kept spotless by an attendant. A waste container encourages employee cooperation toward cleanliness. An extra touch in the direction of cleanliness is given by a germicidal lamp near the washfountains, to help destroy cold germs and the like. Also, a rubber trough mat, containing an antiseptic solution for feet, lies at entrance to shower stall. Certainly nothing has been omitted that advocates health and cleanliness.

3. Girls' restroom. For the dozen or more office and shop girls employed at PMC, its management has provided a separate restroom on the office floor, which effectively combines the functions of a locker room and snack room. Floor is polished linoleum. Walls are done in light blue, with cream-colored acoustic ceiling and lockers. At one end is a modern electric refrigerator, also a cabinet sink, completely equipped with dishes and large electric stove. In the center is a maple dinette set, and at other end are pieces of comfortable rattan furniture and a studio couch. Around the room are potted plants, pictures, magazines, electric clock, ventilating fan, and radio. There are drapes on the windows. The room gives the appearance of a cozy and well-furnished one-room apartment. These details are given mainly to emphasize how far this effort has been deemed worth while for only a handful of girls.

4. Office. An atmosphere of efficiency and cheerfulness prevails in the office appointments. Desks are well spaced, with excellent lighting throughout as provided by continuous-row flush-



"Soundproof" telephone booths in center of shop and at receiving clerk's desk make conversations easier by reducing effect of shop noise

type fluorescent fixtures on 8-ft. centers. Marbleized linoleum floor is kept clean and polished. Entire ceiling is treated with noise-absorptive paneling that hushes working noises. Files and cabinets keep unsightly papers and stock out of view and free from dust. A homelike touch is added by a scattering of potted plants on desks and floor, and by venetian blinds at windows. The same pleasing pattern of appointments holds for the executive office rooms that open into the general office.

5. Shop layout. Being fundamentally a manufacturer of machines in job lots, the company has arranged the machine shop on a functional basis. Machine tools are laid out departmentally according to size of material to be handled. Machining, grinding, and welding operations are located around the three window sides of the room, with assembling operations in the center. Along the fourth side are the experimental laboratory, stockroom, and receiving and shipping department. All shop services and facilities have been designed to conform to that layout.

6. Materials handling. Basically, the product flow is handled on skids that are moved by hand-operated lift trucks. Extra mechanical equipment has been provided, however, to minimize manual effort and provide safe handling wherever possible. For instance, nesting boxes that fit over skid platforms to multiple heights, are used to hold rough or finished castings, and keep them from falling out in transport. An overhead monorail reaches from the receiving and shipping door to stockroom, with a spur monorail arranged so the load can be switched to any location in the weld shop. This monorail carries one 1-ton electrical chain hoist and two 2-ton hand-operated chain hoists.

In the heavy-machine section a 2-ton bridge crane of 25-ft. span runs the length of the department, within reach of every machine, and makes a junction at one end with the receiving monorail system for easy transfer of a load. This crane is equipped with one ½-ton electric chain hoist and one 2-ton hand-operated chain hoist. Average piece handled in this section weighs ½ ton.

In the assembly section an overhead monorail with a 1-ton electric chain hoist takes care of all the heavy lifting for all stations.

Large subassemblies are assembled on special four-legged steel-frame fixtures, at convenient working level. These fixtures have bottom rungs arranged at the same height from floor as skids, so that the fixtures can be moved by lift truck.

At the truck-delivery entrance to the receiving and shipping department two hydraulic lift platforms have been recently installed, to simplify and to expedite the loading and unloading of skids. The lift platforms in their low positions are level with the shop floor, and can be raised to the varying levels of floors of motor trucks in a fraction of a minute.

7. Electrical distribution. Power is purchased from a utility, which brings 2200-volt primary lines direct to plant site. Transformers are located in an outside fenced vault immediately adjoining the shop, from which 220-volt 3-phase feed wires are brought to a main switch on the inside wall. From here current is distributed for power and light, on overhead grid plan, to all points of plant, using well-known 3-bar system of copper conductors running in hollow steel duct. Each machine has its individual power connection with individual cutout switch and starting switch provided with overload and undervoltage protection. The busbar system of power feeders offers great flexibility in shifting connections to the various machines if they are moved.

Most machines are provided with 220/110-volt transformers connected to power circuit of machine for local lighting, thereby avoiding necessity of running separate lines to overhead duct.

8. Lighting. All general lighting is fluorescent type, using 2-lamp 60-watt fixtures on 8x12-ft. centers in most areas.

In assembly areas, stockroom, and experimental laboratory, where ordinarily satisfactory lighting intensities cannot be conveniently increased by local lighting; wherever higher intensities are sometimes needed, this problem has been solved by movable lighting fixtures that can be slid along a trolley track. By this means several fixtures can be temporarily brought closer together to get the desired intensity right at the point where it is needed. Similarly, this flexible arrangement can adapt itself immediately to any general change in assembly layout.

On this same track, movable extension reels are located on approximately 20-ft. centers to provide flexible sources of 110-volt supply for electrical tools used in assembly work. These outlets

are also used to power the 1-ton electric chain hoist on monorail paralleling the trolley track for the entire length of the department.

9. Heating and ventilating. In addition to heat from the overhead unit heaters originally provided in the shop, efficient radiation in the form of a fin-type steam-pipe has been recently installed just below the sill level of the continuous sash encircling three sides of the shop. In cross-section the outer fin dimensions are about 5 inches square. The purpose of this extra radiation was primarily to eliminate the cold drafts from the glass exposure in the cold weather, which were causing discomfort to workers. The pipe also serves to temper the frequency of operation of the unit heaters caused by wide variations in temperature affecting the thermostatic controls. In effect, it compensates for much of the heat loss through the windows. As a result, the unit heaters can be set to go on at higher temperatures, and the hot blasts are less disturbing to the men because of better sustained mild temperatures.

Another provision for worker comfort is the double-door "air lock" at the truck delivery entrance in the shipping section. Ordinarily, a single-door arrangement here would have permitted severe cold drafts into the shop whenever a truck needed to be loaded or unloaded. The air lock consists of a fully enclosed room, about 20 feet long, with an electrically operated metallic rolling door at the outside end, and a pair of large hinged doors at inside and leading directly onto shop floor. When a truck comes in, the inner door is kept closed while outer door is opened; after the truck pulls out, outer door is closed, and inner doors are opened for transfer of material into the building.

In the weld shop, a special exhaust system has been installed for removing heat and fumes through individual hoods at various operations. A duct system is also provided in the grinding and polishing department to remove harmful dust from every operation.

For better ventilation of the shop in warmer weather, 24-in. silent-type fans have been placed on 20-ft. centers about 9 feet above floor level along the continuous sash of north and south sides, to draw in cooler outside air. Similar fans are localized along the column lines in the interior of shop to increase air circulation in the shop. In addition, a 30-in. fan has been set horizontally in each shop skylight, pointing upward, to expedite the removal of warm air from the ceiling.

10. Miscellaneous improvements. Further working comfort has been provided by noise-conditioning practically the entire shop, as well as the offices, laboratories, and other rooms, and by using wood block throughout shop working-areas. These refinements were an afterthought to the original building specifications, but even in a shop as small as this they have proved very effective. As one worker puts it: "We used to hear every noise in the shop, but now we notice only those close to us."

Despite the comparatively small area of this plant, a bell signal system for executives, which is operated manually from the office switchboard, has contributed to its operating efficiency. Signals are heard throughout the shop and in all departments; it is an inviolable rule that they must be answered immediately by the person called.

To facilitate telephone calls from shop to office or outside the plant, a special "soundproof" telephone booth has been placed in the center of the shop, where it can most easily be reached from all corners. A similar booth is found at the receiving clerk's station.

Fire-prevention equipment is available at six stations strategically located throughout the plant. All stations are painted bright red, and marked off with lines on floor to keep away obstructions. Responsibility for inspection and care of fire prevention and safety equipment is vested in a fire and safety committee of four employees who are appointed in annual rotation by the company. They hold monthly meetings to investigate accidents and consider safety suggestions, and otherwise report immediately to a foreman any infractions of safety and good housekeeping rules they might observe.

First aid equipment, including blankets and stretcher, is kept in closed wall cabinets at three locations. Custody of this equipment is given to the first aid committee, consisting of five members qualified by Red Cross certificates to treat all minor injuries.

True, many of the foregoing techniques and types of equipment are not novel, and some of them have existed in other large or small plants for a number of years. What is commendable about them, however, is that so many of them are found in one plant of comparatively small size. This is because the company has realized that it pays to provide the best equipment for its employees, and is aggressively determined to capitalize on this belief at every opportunity. The results it has already obtained in efficient productivity from a contented personnel offer a real challange to any hesitant management that is dubious as to the return on investment in plant improvements.

Fire-prevention equipment at six plant stations is regularly inspected by a fire and safety committee. First-aid equipment at three locations is in custody of committees of five Red Cross certificate holders

Painting the Shop Without Interrupting Production

A. F. FOOSE, Superintendent of Buildings, The Warner Swasey Company, Cleveland

AN EFFECTIVE METHOD of suspending a large canvas sheet to protect operators and machines made it possible for Warner & Swasey Company, Cleveland, to repaint the interior of the main shop without interrupting regular production, although operation was on a three-shift basis.

The portion of the shop that was painted is 350 feet long by 300 feet wide. In view of the length of time required to do the work, it was felt that, unless care were taken to avoid distracting the workers below, considerable interruption of production was likely to result. And it was necessary, or at least highly desirable, to protect the workers and machines from falling drops of paint. At the same time the matter of providing this protection was complicated by the presence of an overhead crane that runs within 6 inches of the underside of the roof trusses. No interruption of the operation of this crane could be permitted.

The bays are 50 feet wide and 20 feet long. Two large pieces of canvas were laced together to cover two bays or an area of 40 by 50 feet.

At first the canvases were hung up in a conventional manner, which took the time of four men for half a day. It soon became evident that, if this method were followed throughout the entire length of the building, a great deal of time would be consumed and production seriously interrupted.

An Ingenious Solution

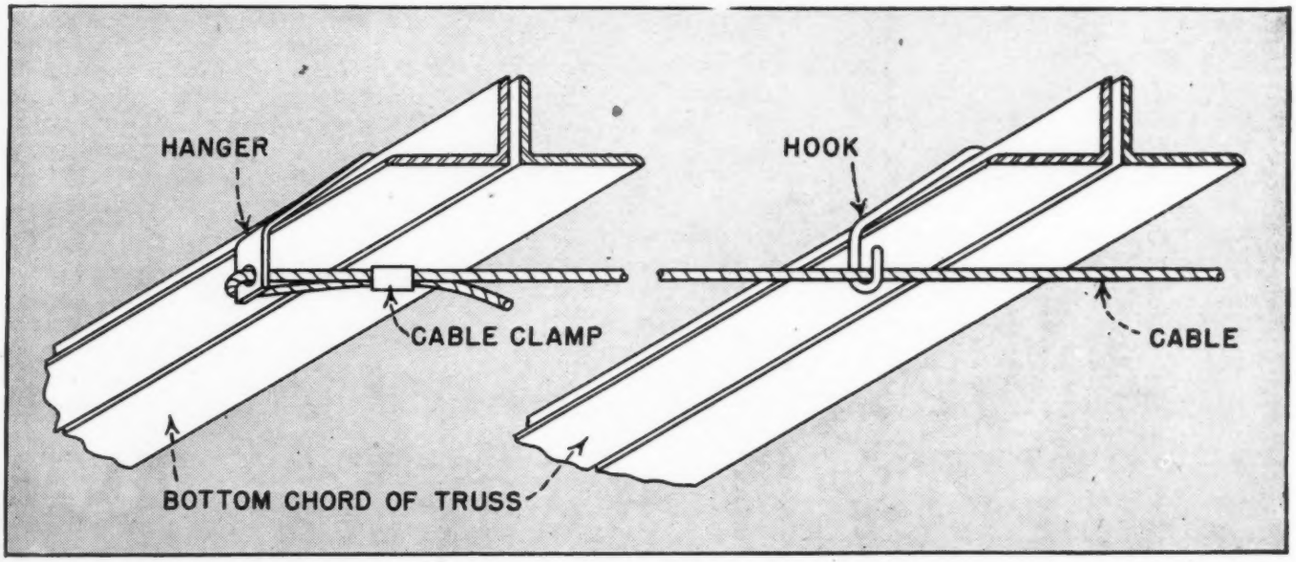
To solve this problem, three ¼-in. steel cables 160 feet long were set parallel to one another and to the crane runway within a bay. One cable was stretched down the center of the bay. The cables on the side were placed so that the maximum space between any two cables was 7½ feet. The ends were secured by ordinary cable clamps, while at intermediate points the cables were supported by hooks bent from ⅜-in. round rods, one end of which fitted into the web of the trusses. Details of construction are shown below.

The two canvases were laced together in the center perpendicular to the cables, placed over the cables, and tied by rope to columns at four corners and at the center of each side. In this way a secure and tight canvas flooring was provided, which was capable not only of collecting all material dropped on it, but which could support the weight of a man in the event of a fall.

When the painting of two bays had been completed, it was necessary only to loosen the tie ropes at the columns and at the center of the canvas and take the cables off the suspension hooks in the area where the canvas was to be placed. Two men standing on the overhead crane were then able to pull the canvas along to its new position. Shifting the canvas and refastening it took two men about one hour.

Two sets of three cables were used so that the canvas was pulled off one set and onto another. The original set was then removed and installed in the next area to be painted.

It was estimated that if the canvas had been stretched and moved by the original method a total of 30 man-days would have been consumed for this operation alone. By the use of the scheme described, however, the total time used was about 30 man-hours.



How steel cables that supported canvas sheets used to protect operators and machines during painting job were attached to roof trusses, to reduce time required to hang and move them

View of Warner & Swasey shop after painting. Portion of shop painted was 350x300 feet. Problem was how to do the job without interrupting production, which at the time was on a three-shift basis. Answer lay in a suspension method which made it possible to slide along a protective canvas sheet as needed

EVERY MONTH, AMONG THE ADVERTISING PAGES, these valuable aids to low-cost production: the plant operation man's guide to WHAT'S NEW in EQUIPMENT (page 170) . . . a summary of LABOR DEVELOPMENTS (page 226) . . . things YOU WANT TO KNOW more about (page 218)

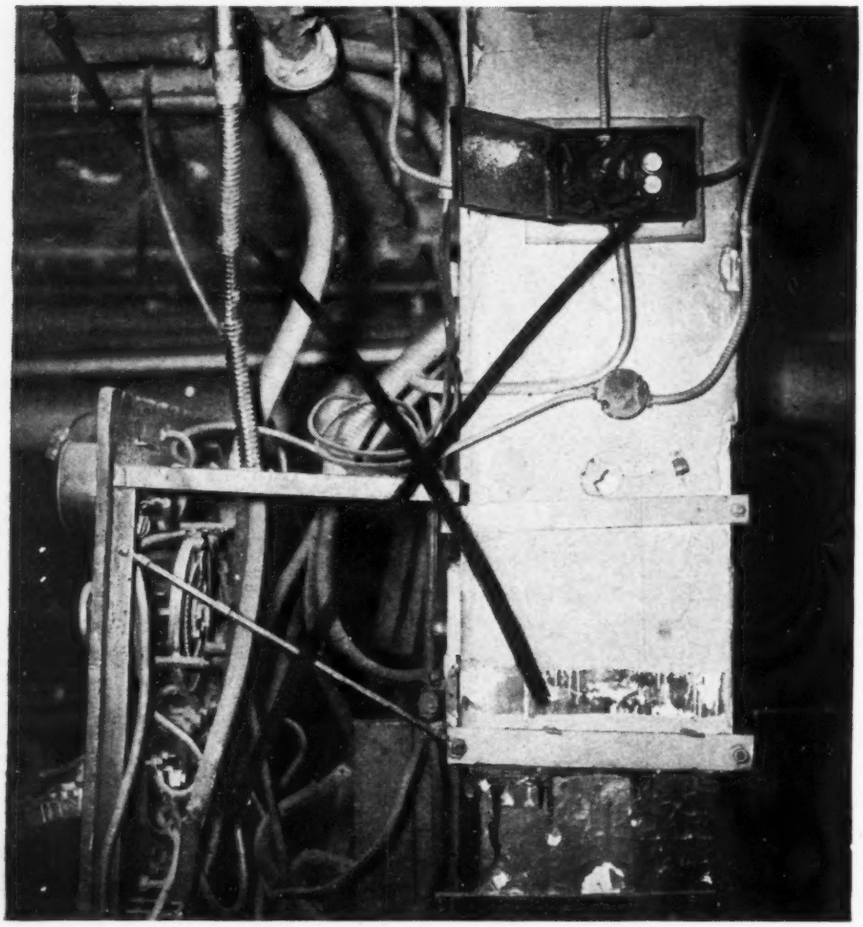
Making Sure the Distribution System Is Adequate

R. B. STEINMETZ, Electrical Engineer, Anaconda Wire & Cable Company, New York

A NUMBER OF CIRCUMSTANCES combine to make a careful examination of the plant wiring system a must at this time. Changes in machine layout, adoption of new methods or processes, addition of new machines, almost inevitably affect the power load and its distribution among the different areas. Age takes its toll. Overheating, whether caused by overloading or by high ambient temperatures, may seriously reduce the life of the insulation.

Failure of a distribution system, or inability to deliver electrical energy continuously and at the proper voltage to the points of use, may easily result in production and other losses that will exceed, perhaps many times over, the cost of any changes needed to make the system completely adequate and thoroughly dependable.

This article will consider the checking of a plant distribution system from the standpoint of (1) adequacy of conductor size to deliver all the power required at the proper voltage; (2) condition of the insulation on conductors.



Here is a prize example of bad wiring. Aside from the unsightly appearance this installation presents serious fire hazards. Wires are not guarded, and unprotected cable is exposed to a hot steam pipe

The right voltage is the one that the nameplate of every piece of electrical equipment says is required for full utilization. The most costly feature of an inadequate wiring system is not the energy wasted in excessive line losses, but the impossibility of full utilization of equipment resulting from excessive voltage drop. This bottleneck, choking production, is reflected not only in the increased costs of power, but in an increase in the unit costs in every department that uses power.

Figure 1 shows what happens to the light output of a 115-volt incandescent lamp when it does not receive the proper voltage. The light output falls off three times as fast as the voltage. For every 10 percent drop in voltage, approximately 30 percent is lost in light output. Thus, a 500-watt lamp on 10 percent undervoltage will give out only 300 watts of light.

Circuits Overloaded

In a Cleveland plant 300-watt fixtures in one bay were replaced by the 500-watt size, to step up the lighting intensity. The foreman complained that there was even less light than before, and investigation proved he was right. The 300-watt 115-volt lamps, rated at 5430 lumens each, were on an overloaded circuit that was delivering only 94 volts, reducing their light output to 50 percent, or 2715 lumens. The increased load of the 500-watt lamps (rated at 9700 lumens each) brought the voltages down to 80 volts, cutting the light of the larger lamps to about 25 percent, or 2430 lumens each.

Fluorescent lamps lose 2 percent in light output for every 1 percent drop in voltage, and a reduction of 25 percent will extinguish the lamp completely.

Electric heating apparatus is extremely susceptible to voltage fluctuations. Only two complaints are commonly made about electric melting pots, ovens, or furnaces—they take too long to heat up, and they do not get hot enough. Figure 2 shows why.

Assume that a tin pot has been in-

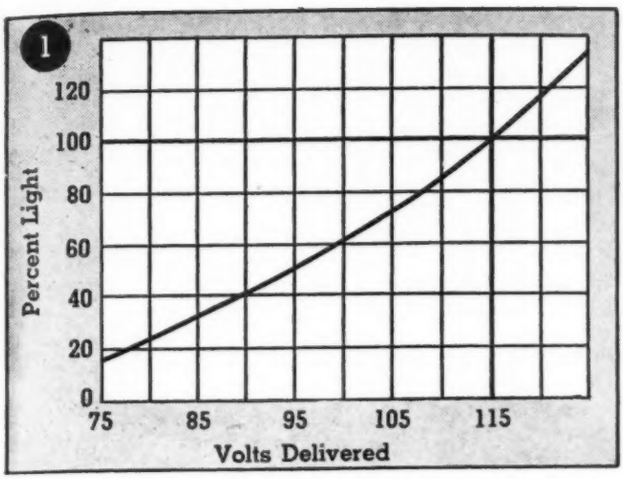


Figure 1. Filament lamps are very sensitive to variations in voltage. Light output decreases about 3 percent for each 1-volt drop in voltage

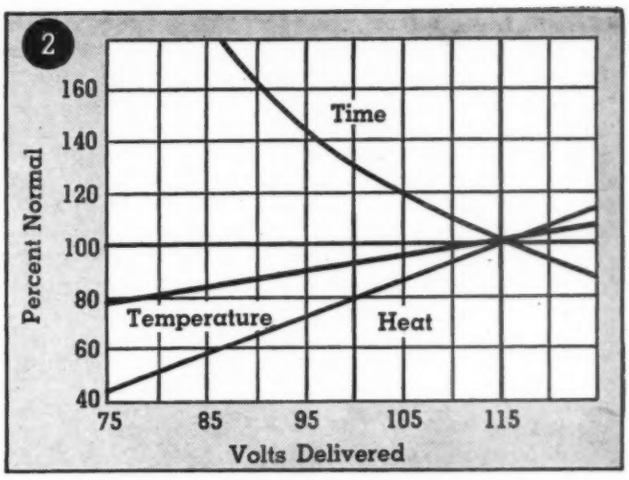


Figure 2. Performance of electrically heated equipment falls when operated on less than rated voltage

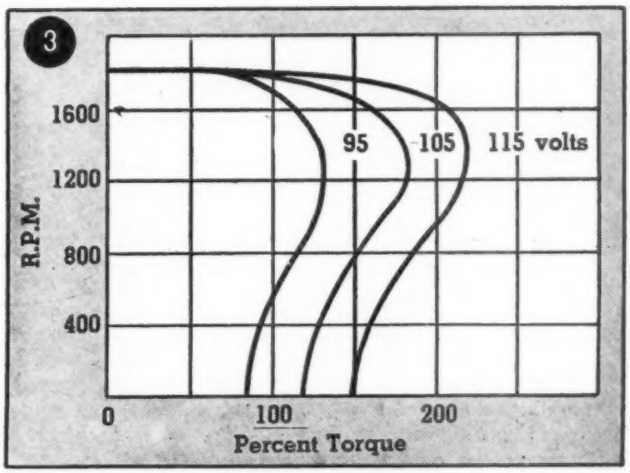


Figure 3. When motors are operated at less than rated voltage their horsepower output drops, may cause stalling if the load is heavy

stalled with a 115-volt unit which the manufacturer says will heat a batch of tin to 500 deg. F. in 10 minutes. If the voltage drop on the line is high, so that energy is delivered at 95 volts, only 70 percent of the rated amount of heat will be generated. The pot will take 16 minutes to heat up, instead of 10 minutes, and the maximum temperature will be only 440 deg. F. instead of 500 deg. F., whereas tin melts at 450 deg. F.

The output of an electric motor is the result of torque and speed. The product of these two is horsepower.

Figure 3 shows how impossible it is for a motor to carry more than a part of its load unless electrical energy is delivered to it at the proper voltage.

Suppose that at full voltage a hoist motor will lift 100 pounds at a speed comparable to a motor speed of 1760 r.p.m. If the load is increased to 225 pounds, the motor will lift it, but the hoisting speed will be reduced to that comparable to 1400 r.p.m. If the circuit is inadequate, however, so that energy is delivered to the motor at only 95 volts instead of 115, the 100-lb. load will be lifted at only 1650 r.p.m., while the 225-lb. load cannot be lifted at all. The motor will stall and heat up in its effort to do the work for which it was intended. The best it can do is to lift 150 pounds at a speed of about 1300 r.p.m.

To lift the 225-lb. load with only 95 volts would take a motor of 50 percent greater capacity.

Voltage Survey

Fortunately, the amount of voltage drop can be checked easily with a portable voltmeter, and a thorough voltage survey ought to be the first step in the program. Start with the service entrance or load side of the transformer. If the drop is excessive, either the utility is to blame or the transformer may be overloaded. Mains or feeders can be checked readily at branch feeder panels, and branches at lighting outlets or motor starters. A comparison can be made between full-load and no-load conditions, but since these readings often are not practicable to make, it will usually be found that readings taken at various distribution centers in the system, with all circuits loaded as heavily as possible, will show up any serious deficiencies.

To insure the proper voltage at the equipment under full-load conditions, the system may be designed to operate at a slight overvoltage when the load is light. The voltage drop or fluctuation between no load and full load should be limited to 5 percent on motor circuits and 2½ percent on lighting and heating circuits. This total drop should be apportioned in the service, mains, and branches by the intelligent selection of copper size and length of run.

Table I is a guide to the control of voltage drop in wiring circuits. The question of reactance is of considerable importance with larger conductors, generally above No. 2 A.w.g. and particularly at lower power factors. To improve the voltage on d.c. circuits, the copper size may be increased or the run shortened, but on a.c. systems reactive drop cannot be controlled so easily.

To select conductor sizes for new construction, or to check present circuits, consult a reliable voltage drop table. Make sure that reactive drop is included when working with a.c. circuits. Also, keep in mind that the spacing between conductors has an important bearing on the reactive drop of open-wire circuits;

Table I. Ways to Improve the Voltage at the Load

Reduce Resistance		Reduce Reactance		Increase Power Factor	
Increase copper size	Reduce length of run	Reduce spacing between conductors	Reduce size, use parallel conductors	Make use of synchronous equipment	Make use of capacitors

Table II. Recommended Minimum Bending Radius for Cables

Type of Insulation	Minimum Bending Radius Factor below times over-all diameter of cable, inches	
Paper		
0-20,000 volts	8	
20,001 volts and higher	10	
Varnished cambric		
0-10,000 volts	5½	
10,001 volts and higher	7	
Rubber or synthetic*	Up to 500 m.c.m.	500 m.c.m. and over
Up to 8/64-in. insulation	3	4
9/64-in. to 12/64-in. insulation	4	5
13/64-in. to 20/64-in. insulation	5	6
21/64 in. and over	6	6

*Extreme care must be used with thermal-plastic insulations at low temperatures

the use of such a table presupposes, of course, an accurate estimate of the load. This is essential to any studies of power circuits.

To illustrate, assume a single-phase feeder, 120/240 volts, 300 feet long with a load of 475 amperes, which is to be limited to a drop of 3 percent or 3.6/7.2 volts.

On a d.c. circuit, 500-cir.mil conductors will limit the drop to the required amount, but on the a.c. circuit 2,000,000 cir. mil will not be sufficient. And there will be little gain with an increase from 1,500,000 to 2,000,000 cir. mil. The only means of reaching the goal of 7.2 volts drop is to cut the load per conductor in half by using two conductors per leg. The same total copper in three conductors per leg will reduce the voltage drop still more.

A safe rule to follow is to limit individual conductor sizes to 1,000,000 cir. mil. On the other hand, too many parallel conductors will complicate the system and make terminations difficult.

Check power factor, particularly if the plant has any appreciable resistance welding load, which has notoriously bad power factor. Naturally, the welders ought to be on a separate feeder and, if necessary, power factor corrective equipment added.

The lagging power factor of large induction motor loads often can be corrected, at least in part, by the substitution of synchronous equipment on constant-speed units such as compressors, pumps, or motor-generator sets.

When proper voltage conditions have been established, the matter of full power delivery can be covered quickly. Line losses in a plant are the kilowatt-hours that appear on the meter and are paid for, but never reach the load. They represent one of the costs of distribution. Their cost is insignificant, however, when compared to the waste resulting from subnormal performance. When the delivered voltage is high enough to permit full utilization, line losses will not be excessive and the distribution system will deliver full power at the right voltage.

Insulation Failure

So far this study of voltage drop and line losses has been chiefly concerned with the copper conductors in the circuits. Assuming uninterrupted supply, continuous delivery of electrical energy depends upon the insulation and its protective covering. Some of the causes of insulation failure and the steps to be taken to avoid them are:

Heat. High ambient temperature; overloaded conductors; congested ducts or conduits.

Moisture. Inadequate drainage; exposure to oil, gasoline, or chemicals; excessive voltage.

Lightning. Switching surges; grounds.

Mechanical injury. Sharp bends; abrasion; impact.

Heat is the most common cause of insulation failure. Excessive heat causes rubber insulating compounds to deteriorate rapidly, as Figure 4 shows. For every increase in temperature of 10 deg. C. the rate of deterioration is approximately doubled.

Whenever current is sent through a wire some of the energy is used in heating the wire. The greater the ampere load, the more heat is generated. The higher the temperature of the wire, the shorter will be the life of the insulation. Thus as early as 1889 the Code authorities decided that in the interests of safety they must limit the ampere-carrying capacities of wire to safe values, and today the Code values are recognized as the maximum allowable values. They are not the economic values, since voltage drop limitations will often dictate the selection of a conductor size larger than the Code tables require.

For Higher Temperatures

Improved rubber insulations will withstand higher temperatures but the best way to meet the problem is to follow a few sound rules in the planning of a wiring system. These rules may be found in the Code handbook or in the publications of manufacturers.

For example, if the ambient temperature is high, use proper reduction factors to obtain the correct current-carrying capacity. When multiple conductors or cables are used, limited air circulation tends to produce higher temperatures and a reduction in carrying capacity per conductor is in order.

An insulation failure usually is the result of a combination of the causes listed before, rather than of a single one. For example, a rubber insulated wire in a low-voltage power circuit seldom fails from moisture alone. Either the insulation has been cut by mechanical injury or has cracked from excessive heat, leaving an open path for moisture to ground the conductor. An investigation disclosing a damp conduit or conductor is then likely to lead to the erroneous conclusion that moisture caused the failure.

If it is impossible to keep ducts or conduits dry, or if they go underground where they might be flooded, do not use ordinary braided wire. A sheath of lead, rubber, synthetic rubber or synthetic resin, or an approved moisture-resisting wire should be specified. If oils or greases are to be encountered, avoid the use of unprotected rubber.

For corrosive conditions, Figure 5, such as produced by acids, alkalis, or other chemicals, it is best to consult the manufacturer for specific recommendations.

Excessive voltage is not usually a cause of failure on low-voltage systems,

but primary distribution systems of 2300 volts and higher must be carefully protected. An insulated cable run connected directly to an exposed overhead line is always vulnerable to lightning surges. Protect the cable by lightning arresters, and shield it properly either by the use of a lead sheath on single-conductor cables or copper shielding tapes on multiple-conductor cables.

In fact, shielding is recommended for all rubber-insulated cables designed for 2300 volts or higher. To be effective, the shielding tape must be well grounded and kept continuous throughout the length of the run.

Exercise of good common sense will usually suffice to avoid mechanical injuries to wires and cables. If bent too sharply, insulations will crack or crease. Recommended limits of bending radii are given in Table II.

Protect unarmored wires and cables in exposed positions by conduits or ducts, and see that the conduits are free of obstructions that might cause injury.

Figure 4. This view shows what happens to rubber insulation when it is exposed to excessive heat, which is one of its most deadly foes

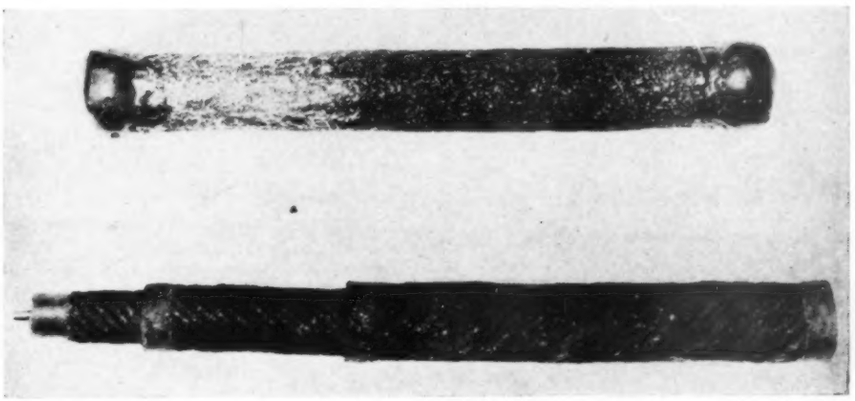


Figure 5. The effects on a cable cover of a short-time exposure to acid fumes are shown at the top. Below is shown an example of rotting produced by exposure to muck and silt from tide water

Check the Insulation

When unarmored cables are buried, they must be protected from injuries resulting from careless digging. A creosoted plank or half-round tile buried immediately over the cable will be found suitable. Make the trench deep enough to place the cables below the frost line. Unless the soil is sandy, it is well to spread a layer of sand or soft dirt over the bottom of the trench.

The most convenient means of checking the condition of insulation is by measurement of the insulation resistance. In interpreting the readings taken keep constantly in mind that many factors, most of them not reflecting in any way the condition of the insulation, can cause wide fluctuations in measurements. Since all leakage paths to ground are in parallel, the insulation resistance will be lower with increased length of the conductor and with the addition of parallel circuits.

Insulation resistance falls very sharply with increasing humidity and temperature. For example, a piece of Code wire, when measured at 85 deg. F. will have only one-third the insulation resistance it will have when measured at 60 deg. F. Accordingly, it is most important to correct all readings for temperature before interpreting them.

High insulation resistance in itself is not essential in power distribution circuits. The trend of values, however, does indicate the trend of the condition of the insulation.

Figure 6. Not often caught in the act, as this one was, rats and mice nevertheless often damage cables sufficiently to cause failure. Termites are particularly destructive to some types of cables buried without protection

Correct Sudden Drops

Sudden drops in insulation resistance measurements should first be corrected by consideration of the influencing factors, keeping in mind that the temperature of the insulation is more important than the temperature of the air. The presence of parallel circuits must also be considered but, of course, for most accurate results, wire and cable runs should be measured when isolated. If the circuit reads abnormally low, suspicion is to be directed first at joints, or insulated equipment, since not only can the insulation generally be more readily restored at these points, but it is more susceptible to deterioration from dust and moisture. When it is certain that the wire or cable insulation is at fault, the weak spot must be located by the measurement of isolated lengths at the joints.

Lighting Equipment

Lighting equipment introduced to you by *Factory* during the past 12 months is reviewed here to give you a quick one-year summary. To this summary has been added a description of some of the new equipment shown at the Victory Lighting Jubilee, held in New York City November 26 to 30.

ALL - STEEL REFLECTORS – Formed of heavy gage steel, reflectors for fluorescent lamps are available in open- or closed-end types. Mounted individually or in continuous rows, for surface or suspension mounting. Model No. 2082 for two 40-watt lamps, No. 2086 for three 40-watt, and No. 2088 for two 100-watt lamps are open-end types; Model No. 2090 for two 40-watt, No. 2094 for three 40-watt, and No. 2096 for two 100-watt lamps are closed-end. Mitchell Manufacturing Company, Chicago.

BLACK LIGHT LAMPS–for industrial instrument illumination and other applications, operate on 120-volt a.c. and 24-28-volt d.c. circuits. The near ultraviolet RP 12, rated at 4 watts, is for use with a visible light filter where lightweight, compact lamp is required. Equipped with polarized bayonet base, may be operated with inspection or other industrial equipment. Sylvania Electric Products, Inc., Salem, Mass. (Figure 1)

CLOSED-END FIXTURES–"Stream-Flo 48" units for 40-watt fluorescent lamps are 2- and 3-lamp fixtures. Reflector is closed-end type, 20-gage porcelain-enameled steel. Conventional or instant-start ballasts optional. Benjamin Electric Manufacturing Company, Des Plaines, Ill.

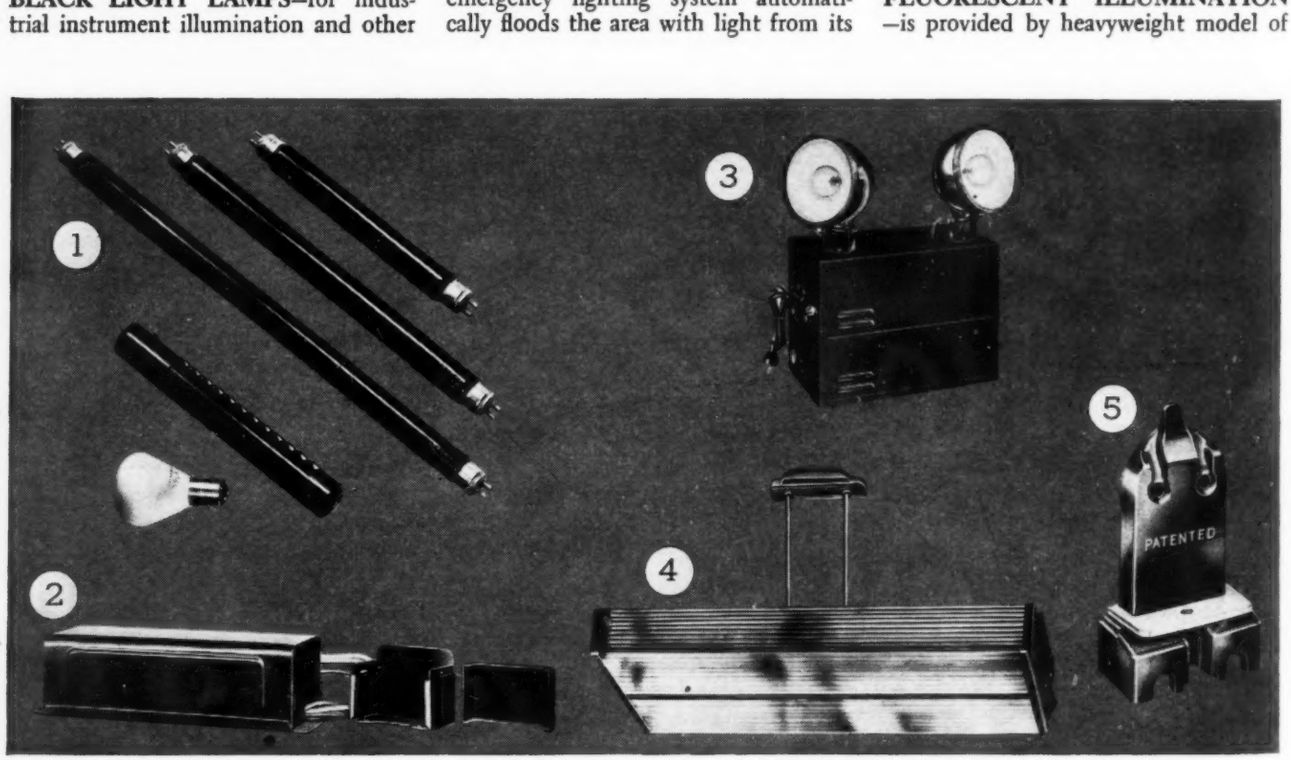
COLD CATHODE BALLAST–To fit manufacturer's cold cathode ballasts, the junction box can be attached with bolts used for mounting standard ballast. Box is made in two pieces–one is designed to slide over guides on one end of ballast case, while the other forms cover, secured by screw. Knockouts provided in sides, ends, and bottom. Jefferson Electric Company, Bellwood, Ill. (Figure 2)

EMERGENCY LIGHTING–When current supply is interrupted, portable emergency lighting system automatically floods the area with light from its own power. Known as Minuteman Light-Warden, it can be installed on post, bracket, shelf, or platform. No special wiring required; plugged into any convenient outlet in lighting circuit. Electric Cord Company, New York. (Figure 3)

FLUORESCENT FIXTURE–The A-3440 Permaflector shielded-type fluorescent luminaire, 4-40 watts, has Satinol-finish contrasting removable glass panels. Lighting is controlled, and mounting is flexible–may be individual, continuous, direct ceiling, or suspension. The Pittsburgh Reflector Company, Pittsburgh. (Figure 4)

FLUORESCENT FIXTURES–have completely wired housing and removable 20-gage all-metal reflector. Can be surface or suspension mounted, in single or continuous lengths. Reflecting surface is finished in oven-hardened gloss white, and exterior is gray. Made in two types–Victory E, Model E2 24, with two 20-watt lamps, and Model E2 48, with two 40-watt lamps; and Victory J Nos. J2- to J4-48, for two, three, or four 40-watt lamps, as well as No. J2-60, with two 100-watt lamps. Metropolitan Fluorescent Company, Inc., Brooklyn, N. .Y

FLUORESCENT ILLUMINATION –is provided by heavyweight model of

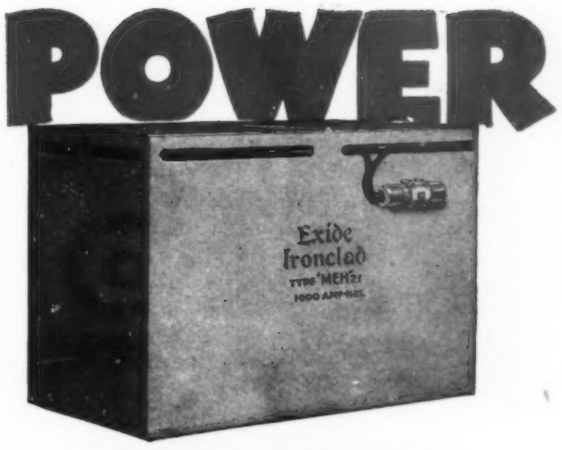


EXIDE-IRONCLAD POWER PROVIDES THE THREE "HIGHS" THAT ASSURE FULL SHIFT AVAILABILITY

Exide-Ironclads have the *high power ability* needed to meet the higher kilowatt demands encountered in frequent "stop and go" service . . . they provide *high maintained voltage* throughout discharge, assuring a uniform rate of operations . . . and their *high capacity* keeps electric industrial trucks steadily on the job throughout each shift.

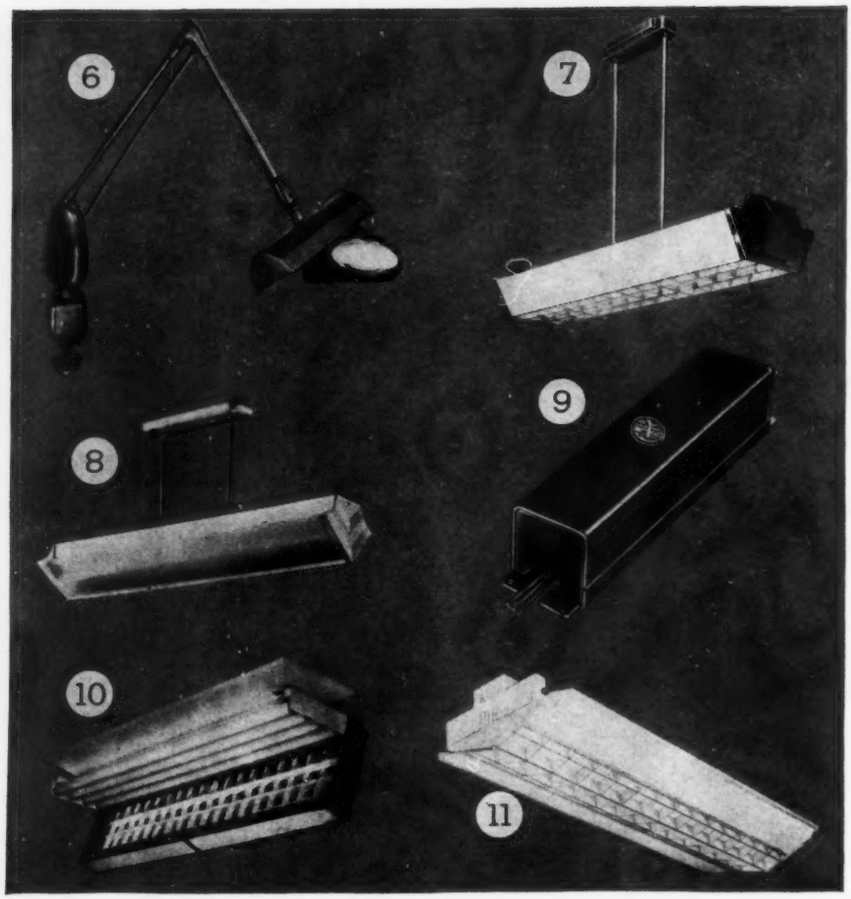
These—with Exide dependability, long-life, ease of maintenance and safety—assure "full shift availability," plus the increased tonnage and greater economy that result.

Write us for a FREE copy of the bulletin "Unit Loads" prepared by The Electric Industrial Truck Association. It tells how to cut handling costs up to 50% . . . covers latest developments in materials handling . . . and includes actual case histories.



Exide
IRONCLAD
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*



Quick-Liter fixture, with lateral ribbed reflector. Ribs are claimed to minimize dents caused by accidental blows or dropping, and also to provide straight reflector edges. Equipped with combined hot and cold cathode lamps, fixture is available in 2-40 and 4-40 fluorescent lamp sizes, for 115- or 230-volt, 60-cycle, a.c. operation. The Edwin F. Guth Co., St. Louis.

FLUORESCENT LAMP—Low-brightness 40-watt, 4500-white fluorescent lamp in the 100-watt lamp size is designed to provide illumination with reduction in shielding, without appreciable or corresponding increase in glare. A starting stripe running lengthwise along tube of lamp facilitates starting. Lamp is suitable for use under normal conditions of humidity. General Electric Company, Cleveland.

FLUORESCENT LAMP—Type T-12, 40-watt, operates with instant starting ballast, and is treated to eliminate operating faults encountered in conditions of high humidity. Lamps are used in 2-lamp compensated ballast circuit providing 450-volt operation without affecting light output, life, or other features of standard 40-watt fluorescent lamps. Coatings are said to prevent formation of film of moisture. Sylvania Electric Products Inc., Salem, Mass.

FLUORESCENT LAMP HOLDER—of plastic, known as Flex-Loc, is flexible, automatic, and self-adjusting to variations in length of lamps, or to spacing of mounting holes in reflector units. Has automatic lock, and is said to stand shocks and vibrations without loosening contact. Adaptable to all fixtures. Lloyd Products Company, Providence, R. I. (Figure 5)

FLUORESCENT LAMP MAGNIFIER—Adaptation of magnifying lens to fluorescent lighting is made with Super Sight lens and light assembly. Mounted on balanced bracket that can be placed in any position over work area. Supplied in three types, with standard bayonet type bulbs, lamps sealed to relieve explosion hazard, or fluorescent lamps. The Boyer-Campbell Company, Detroit. (Figure 6)

FLUORESCENT LAMP STARTERS—Two manual re-set type starters are for 100-watt fluorescent lamps. The COP-6 is a two-contact starter, while COP-64 is provided with four contacts. Both are said to cut out deactivated lamps, and to eliminate lamp flashing and damage to ballasts. Another starter, COP-40, is for 40-watt lamps. Sylvania Electric Products Inc., Salem, Mass.

FLUORESCENT LAMP TESTER—designated Model No. A-172 Compco tester, has starter socket on the same instrument board, to test FS-2 for 14-, 15-, 20-watt lamps, and FS-4 for 30- and 40-watt lamps. Device is 5½x11 inches, weighs 5 pounds. Commercial Metal Products Company, Chicago.

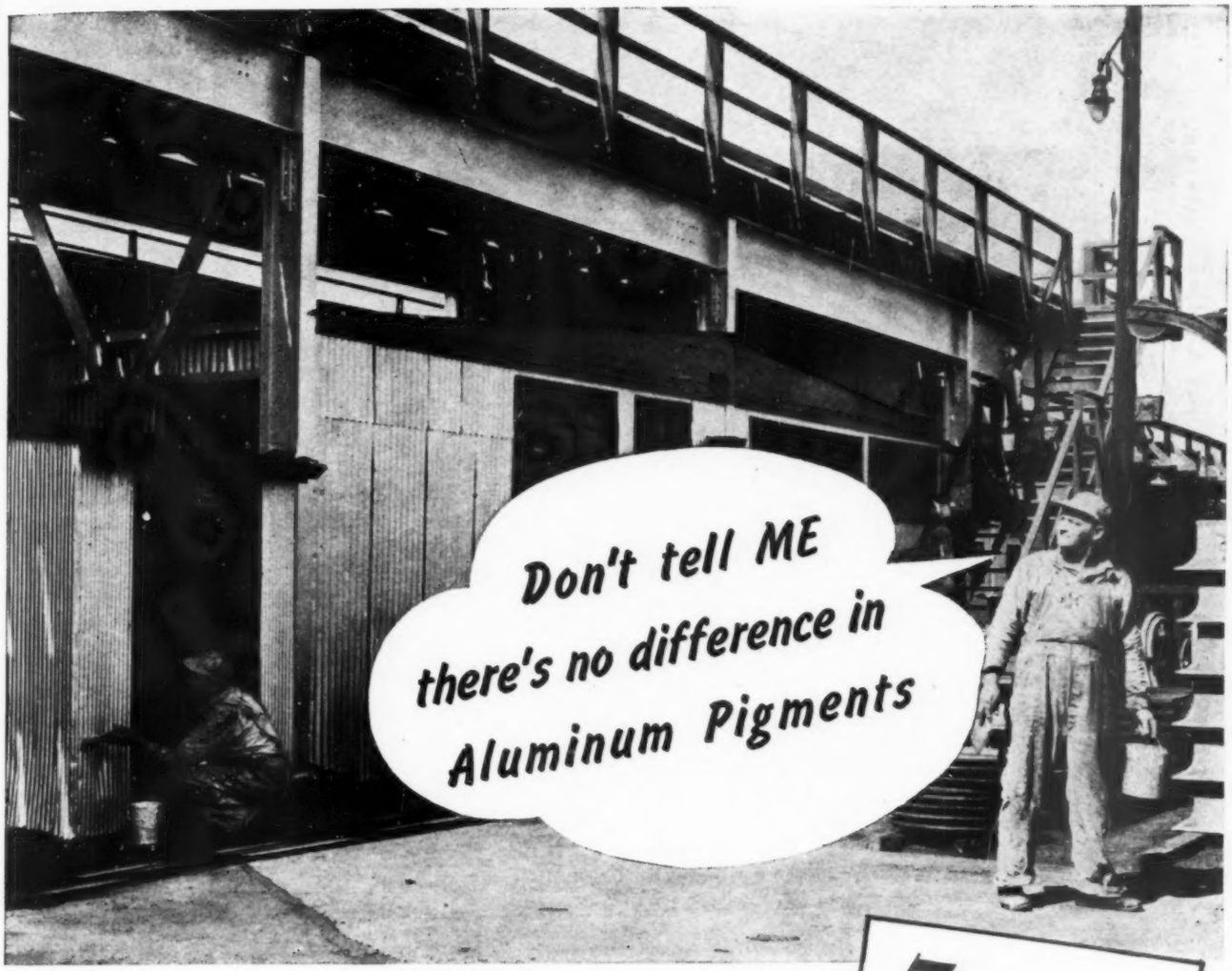
FLUORESCENT LAMPS—designated as Type LS, are claimed to provide instant starting, as well as simplified installation and maintenance. Without starters, lamps also may be operated in series on a single ballast at 100 or 200 milliamperes, or at other currents within this range, for high lighting levels or lower intensities. Sylvania Electric Products, Inc., Salem, Mass.

FLUORESCENT LIGHTING—The Wilson No. A-4440 fluorescent luminaire features an eggcrate louver bottom, which is said to eliminate dust, to shield tubes, and to provide glareless illumination. Hinged louver may be detached for maintenance. Unit utilizes four 40-watt T-12 fluorescent lamps operating on voltage of 110-125, 60-cycle a.c.; also available in 50-cycle. The Pittsburgh Reflector Company, Pittsburgh. (Figure 7)

FLUORESCENT LIGHTING—Glass-shielded fluorescent fixture is made for four 40-watt tubes. High efficiency with low intrinsic brightness is said to be effected by removable panels of ribbed ceramic coated glass having 80 percent transmission factor and diffusing qualities. Can be used without glass shield as well. Instalite feature is optional. The Spero Electric Corporation, Cleveland. (Figure 8)

FLUORESCENT LIGHTING BALLASTS—for hot and cold cathode lighting, are claimed to feature close matching with tube characteristics, as well as reduction in end-blacking and premature burnout. Quiet in operation, they are suitable for installation where noise level is low. Two-way roll-turn lead-out is said to prevent strain on lead insulation, and to make wiring easy. American Transformer Company, Newark, N. J. (Figure 9)

FLUORESCENT LIGHTING FIXTURE—E-Z Servicer fixture is hinged so that one man can open it for cleaning or changing tubes. No tools are required. Made in four models, including ribbed glass glare shield, louvered, industrial, and commercial types, with 2, 3, and 4 tubes, and starter or instant



The brush tells the painter with each stroke. And your eye tells you when you scan the finished job. There IS a difference in aluminum pigments. A *good* pigment that's made right goes on easier and looks better.

With Alcoa Albron pigment mixed in proper proportion in the right kind of vehicle you get an aluminum paint that satisfies in every way. To begin with, Alcoa Albron is made from aluminum that must analyze *more* than 99% pure. And during the manufacturing process, this superior pigment is put to test after test to make certain that its leafing properties, particle size, color, and other qualities are "on the nose" . . . or better.

Be particular about the pigment as well as the vehicle when you buy aluminum paint and you will be well repaid in extra-long life, *uniform* color, *lasting* reflectivity, and every other way that good aluminum paint pays off.

ALUMINUM COMPANY OF AMERICA. 1983 Gulf Building, Pittsburgh 19, Pa.

7 ADVANTAGES of Aluminum Paint

- High durability
- High reflectivity
- High hiding power
- Resistance to moisture
- Resistance to fumes
- Resistance to heat
- Attractive appearance

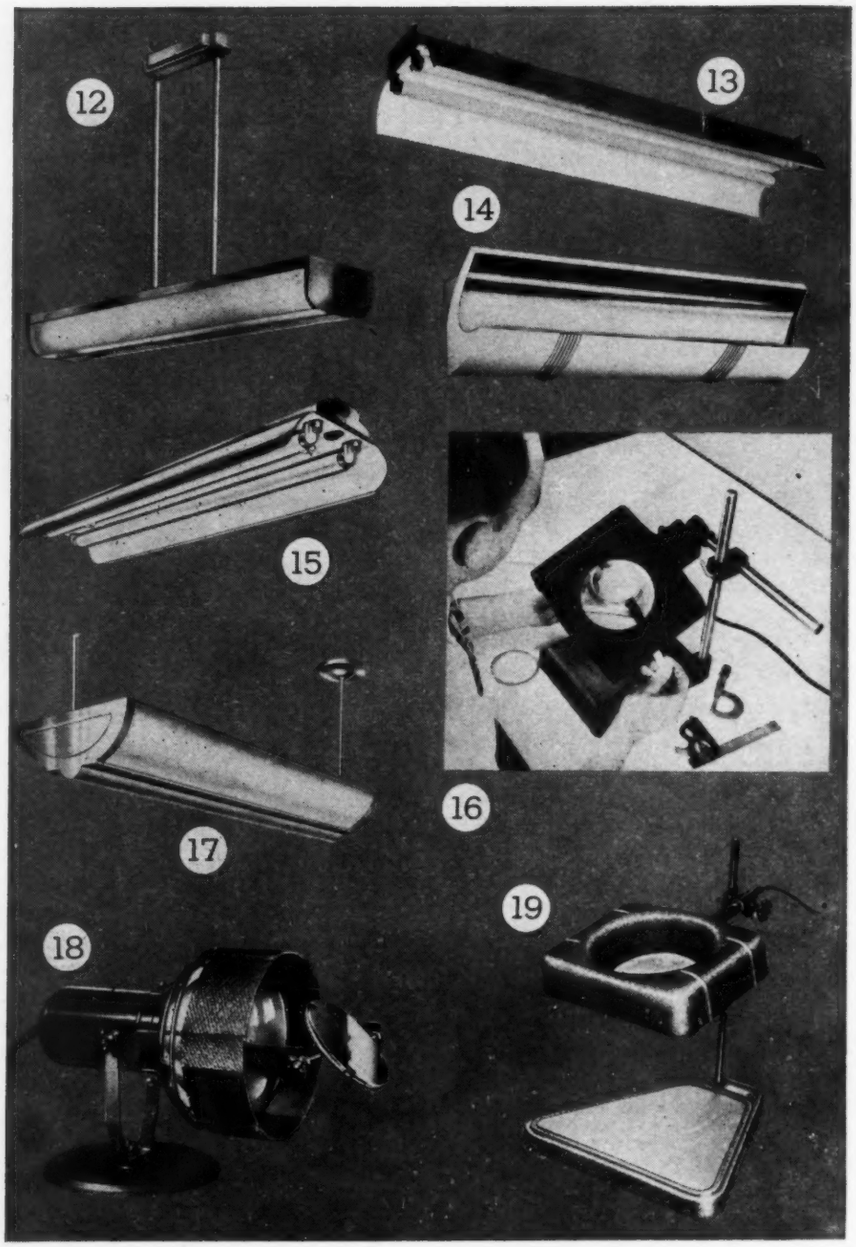
This means 99+ . . . assures better Aluminum Paint

When you buy aluminum paint insist on getting Alcoa Albron pigment, made from 99+% pure aluminum. Purity is vital for best results. Also important is a good manufacturer's name behind the paint.

ALCOA ALBRON PASTE IS MADE UNDER PATENTS OF THE METALS DISINTEGRATING COMPANY, INC.

ALCOA ALUMINUM

ALBRON



type ballast. Can be installed either in single ceiling fixture or in continuous runs. R. & W. Wiley, Inc., Buffalo. (Figure 10)

FLUORESCENT LIGHTING UNITS—with open- or closed-end porcelain-enameled one-piece reflectors, include two and three 40-watt, as well as two 100-watt lamp designs. Auxiliary equipment is attached to hood to allow removal of reflector without disturbing wiring. Ballasts are high-power factor type. Bright Light Reflector Company, Inc., Bridgeport, Conn.

FLUORESCENT LUMINAIRE—Eggcrate Aristolite fluorescent fixture combines lamp-shielding and glass diffusion. Provides down-lighting through eggcrate louvers, plus diffused side lighting through glass panels. Has paneled and die-cut ends. Glass panels and eggcrates can be separately removed for maintenance. Available for individual or continuous installation. Uses four 40-watt fluorescent lamps. Edwin F. Guth Company, St. Louis. (Figure 11)

FLUORESCENT LUMINAIRE—Utilizing two 40-watt T-12 fluorescent lamps, No. A-1240 Permaflector luminaire embodies removable Skytex Satinol diffusing ribbed glass side panels with curved lower halves. Has opening at bottom for vertical baffle. Reflector, baffle, and top housing are formed without seams from single sheet of 20-gage steel. Pittsburgh Reflector Company, Pittsburgh. (Figure 12)

FLUORESCENT LUMINAIRES—Series 1300 individual or continuous fluorescent luminaires feature 20-gage steel housing and reflector, 14-gage steel lampholder and safety adjustable brackets, as well as ¼-turn cam type fasteners. Reflector has folded construction to eliminate sharp edges and provide added rigidity. Snap-on ends give individual or continuous wire-way from one basic unit. Watco Engineering, Inc., Cleveland.

FLUORESCENT REFLECTOR — called Reflecto-Duct, is completely wired with high power factor equipment, lamp sockets, and removable starter switches. Has chain suspension bracket and knock-out for conduit suspension. Reflector is removable to facilitate maintenance. Unit top contains auxiliary equipment. Available in two-or three-lamp units, using lamps of 40 and 100 watts. Philadelphia Electrical & Manufacturing Company, Philadelphia. (Figure 13)

FLUORESCENT UNIT—for illuminating areas where long, continuous lines are to be used, can also be employed as exposed troffer in certain installations. Available with or without all-steel louvers, which provide 25-deg. crosswise, and 15-deg. lengthwise shielding. Supported at 4 points, and may be swung down for maintenance. Wired for 110-125 volts a.c., but can be furnished for 220-250 volts. Curtis Lighting, Inc., Chicago.

GERMICIDAL LAMPS — Rad-I-Air Conditioners equipped with germicidal lamps are designed for disinfecting the air to reduce infectious disease organisms in the treated area. Model 991 is for upper air irradiation, 981 for lower air, and, when used with louvers, provides a downward barrier of ultra-violet energy. Made in 15- and 30-watt sizes. Tru-Air Ultraviolet Products Company, Los Angeles. (Figure 14)

HEAVY-DUTY FIXTURES—Heavy-duty fluorescent fixtures with porcelain-enameled reflectors are said to have reflection factor of 79 percent or more, and lateral shielding angle of 13 degrees on 40-watt units, 14 degrees on 100-watt units. Furnished wired, and include high power factor ballasts, sockets, and starters for 60-cycle a.c. operation. Instant-starting ballasts are available, as well as wire bale type lamp guards, or steel louvers. Day-Brite Lighting, Inc., St. Louis. (Figure 15)

ILLUMINATED MAGNIFIERS—for inspection of small objects, are called C-Master magnifiers. Two of three all-

WHEN PIPING IS PART OF A PRODUCT

EQUIPMENT manufacturers who build products using piping find many advantages in Tube-Turn welding fittings. Here, for instance, is a Votator—one of many models of food processing equipment made by The Girdler Corporation. The piping system must be compact, leakproof, able to withstand pressure at high temperatures. Tube-Turn welding fittings meet every requirement.

If your product calls for piping insulation, remember that Tube-Turn welding fittings are streamlined, saving insulating time and expense. Their smooth interiors make for maximum efficiency of flow. Their uniform wall thickness permits cutting for odd angles with complete assurance of perfect roundness.

Many equipment manufacturers are discovering what piping engineers have long known—that Tube-Turn welding fittings offer exclusive advantages wherever piping efficiency is a factor. Tube Turns engineers will be glad to help on your individual problem, without obligation.

Selected Tube Turns distributors in every principal city are ready to serve you from their complete stocks.

TUBE TURNS (Inc.), Louisville 1, Kentucky. Branch Offices: New York, Chicago, Philadelphia, Pittsburgh, Cleveland, Dayton, Washington, D. C., Houston, San Francisco, Seattle, Los Angeles.

TUBE-TURN TRADE MARK **tt** *Welding Fittings and Flanges*

angle illuminated models are stand units, and the third is a portable hand type. Lighting equipment of stand Model 410 and portable Model 610 consists of four incandescent tubes, and two fluorescent tubes are used in stand Model 210. Large 4½-in. double convex lens magnifies all objects twice. Ullman Products Company, Brooklyn, N. Y. (Figure 16)

INDIRECT LIGHTING—Cadet is a luminous indirect type lighting, suspended 24 to 30 inches beneath the ceiling in individual or end-to-end arrangements. Translucent white deflectors deliver in the ratio of 90 percent upward and 10 percent downward. Fixture surfaces are less than 1 candlepower per square inch. Made for 40-watt, 100-watt, and 40-watt F. lamps. The Edwin F. Guth Company, St. Louis. (Figure 17)

INSPECTION LAMP—known as Model No. 7500, is for examining objects with deep openings, for burrs, grease, and defects. Light is thrown inside the cavity where needed, reflecting it clearly in the adjustable mirror. Lamp has 100-watt, 120-volt rating. Plugs in any light socket. McGill Manufacturing Company, Inc., Valparaiso, Ind. (Figure 18)

INSPECTION LIGHTS—for interior and other hard-to-see surfaces, consist of miniature lamp mounted at end of rigid sectional rod or flexible cable, which can be bent to any shape. Provision is made for mounting, in front of lamp, a mirror, or bar magnet to pick up small iron parts. Van Wagner Company, Richmond Hill, N. Y.

MAGNIFIER—Illuminated magnifier, called Model C Magni-Ray, is designed to simplify and speed up visual inspection operations. Suitable for observing wide field at one time. Magnifier is equipped with two 25-watt tubular bulbs, and wired for use on 110-volt current, a.c. or d.c. George Scherr Company, New York. (Figure 19)

RECESSED FLUORESCENT FIXTURE—troffer type is designed to fit in as little as a 7-in. space between the true and the false ceiling. Glass shield or louver may be opened or removed for maintenance. No tools are needed to clean or change tubes, and top of reflector also is removable. R. & W. Wiley, Inc., Buffalo. (Figure 20)

REFLECTORS—Large industrial reflector units, 48x13½ inches, for two, three, and four 40-watt lamps, can be ganged, without additional accessories, in continuous rows. Starters are accessible on side of channel housing. A Twin Turret lampholder, for two 40-watt lamps, has deep drawn socket in heavy gage steel. Lamps are pushed in place, and reflector is removed by a push-over action. Single-lamp reflectors for 20- and 40-watt lamps are 25 to 98 inches long. L. J. Segil Co., Chicago.

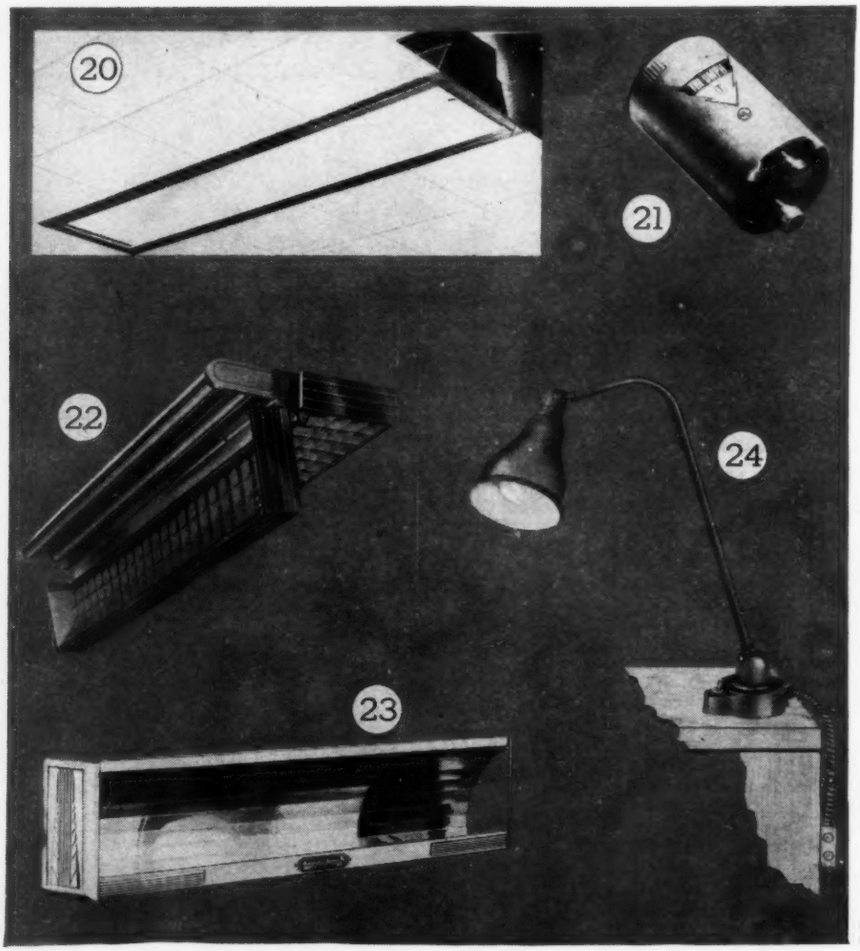
STARTER—known as Tri-Umph Glow, for fluorescent lamps, has two outside terminals, connected to each side of the lamp. When current is applied there is practically no voltage drop across the lamp. Ionization occurs in the low pressure neon or argon atmosphere tube, according to type of lamp. Condenser is enclosed to prevent radio interference. Burkaw Electric Company, New York. (Figure 21)

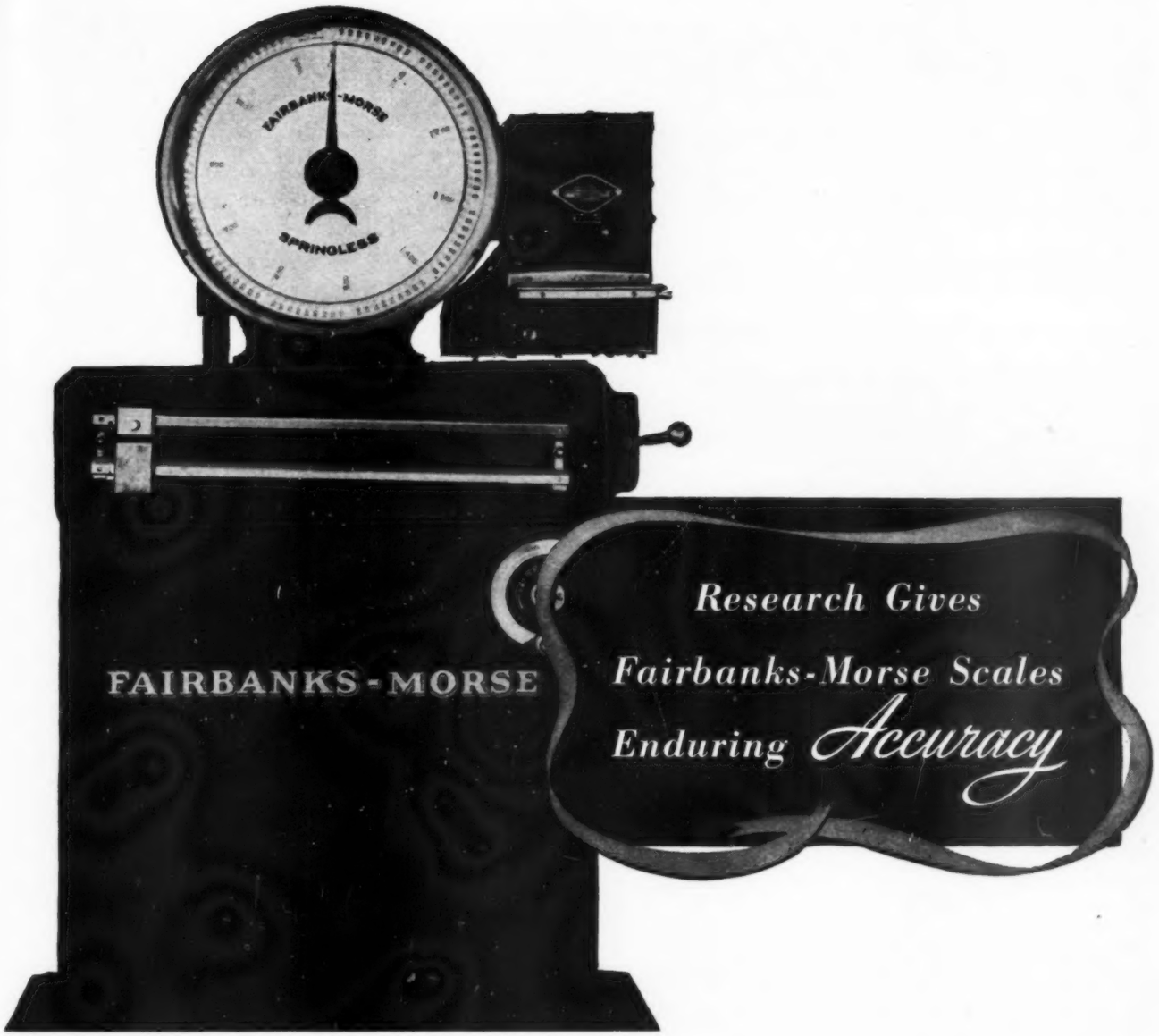
STEEL FLUORESCENT UNITS—Models B101 and B103 luminaire for two 40-watt; B102 for four T-12 40-watt; B105 for three T-12 40-watt; B201 for two 100-watt; and B202 for four 100-watt fluorescent lamps have all-steel reflectors and channels. Units are said to provide 85 percent reflectivity and uniform light distribution. Electro Manufacturing Company, Chicago.

STEEL LIGHTING FIXTURE—is suitable for lighting drafting rooms, offices, and factories. Each model is made for a specific lighting situation. Hinged eggcrate louvers, made in two sections, give access to the lamps. A. L. Smith Iron Company, Chelsea, Mass. (Figure 22)

ULTRAVIOLET GERMICIDAL LAMPS—Bactericidal radiation is provided by Disinfectaire ultraviolet germicidal equipment. One 30-watt unit is claimed to destroy 99 percent of the disease-producing germs in 700 cubic feet of air in one minute. Wall and pendant types supply upper-air disinfection, and barrier units are for upper and lower air treatment. The Art Metal Company, Cleveland. (Figure 23)

WORK LIGHT—can be attached to machine tools, assembly benches, and desks. Comes with Greenfield cable and leads, for direct attachment to outlet box or transformer. Available with arms from 12 to 30 inches long, and with or without removable frosted, clear, or daylight glass lens. Swivelier Company, New York. (Figure 24)





Fairbanks-Morse Scales have earned their world-wide reputation for enduring accuracy through constant research to improve even the most minute parts—through research in the selection of the most enduring materials—through research in design to perfect each part. This has been the Fairbanks-Morse policy for over a hundred years, and it continues to be the Fairbanks-Morse policy today.

Skilled craftsmen produce these parts with the aid of modern machines. Trained assemblers put them together. A weighing machine so constructed performs accurately day after day, year after year.

Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines
Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment

MAINTENANCE SHORTS

Readers are invited to contribute brief articles, illustrated when possible, reporting out-of-the-ordinary maintenance accomplishments. Accepted articles will be paid for

FIFTY DOLLARS

Will be paid for the best Maintenance Short published in each issue of *Factory* until further notice. (Do not submit Shorts that deal with production processes.)

All other Shorts accepted for publication will be paid for at attractive rates.

Contributors may submit as many items as they wish. Mail yours today!

Prize-winning short this month, "Ramp Over Tank Saves Oil," below

Ramp Over Tank Saves Oil

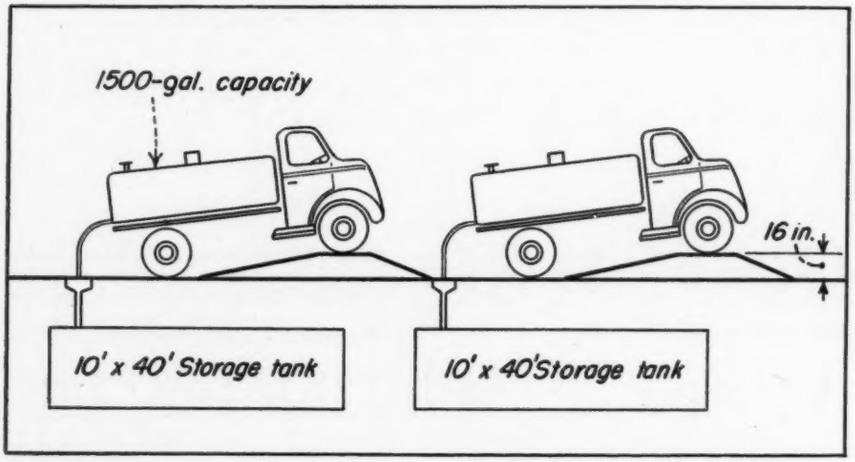
RICHARD DILWORTH, Lorraine Manufacturing Company, Pawtucket, R. I.

Some years ago when I was plant engineer of a large textile plant in New England, I found that through a simple device a very considerable amount could be saved on the fuel oil bill.

Our oil was delivered by truck, and we were using approximately ten trucks a day, at $1.55 a barrel. One day I checked on the time it took to drain a truck. Twelve minutes were allowed by the driver, who had to keep to a pretty rigid schedule in order to make all his deliveries. As he was about to leave, I suggested that we take a look into the truck. We found that nearly three-quarters of a barrel of oil still remained. Assuming that his load and delivery was typical, at this rate we were losing about $10 worth of oil a day.

A simple method of forstalling this loss was devised. Using some old lumber that was lying around, I had an inclined ramp built over the storage tanks, so that as the trucks were drained, the outlet at the back of the truck was approximately 16 inches lower than the front. The time needed to drain a truck was in this way reduced to approximately 8 minutes, and, in addition, trucks were now completely drained.

Although this is a comparatively small detail, three-quarters of a barrel of oil in ten trucks a day amounts to a good-sized sum in the long run, and by the use of this device, a substantial amount may be saved.

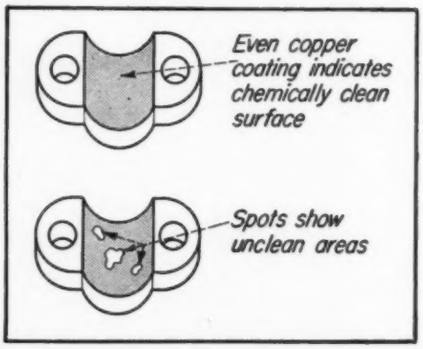


Compound Shows When Metal Is Clean

JOHN KRILL, Youngstown, Ohio

Many failures in babbitting bearings can be eliminated by the use of a chemical indicator that is easily compounded. Babbitt will not stick to unclean surfaces. The indicator is nothing more than a solution of copper sulphate (blue vitriol) dissolved in water, to which a few drops of sulphuric acid have been added.

To use, swab over the bearing cap in which the bearing metal is to be cast. If the surface is chemically clean, an even coating of copper will immediately appear over the entire surface. Where the bearing has not been thoroughly cleaned, the copper coating will not cover the unclean area. This makes it easy to know when a surface will insure a good bond with the bearing metal.



•

Marking Machines and Parts by Welding

J. JEROME REICH, Reich-Huntington Iron Works, Huntington, West Va.

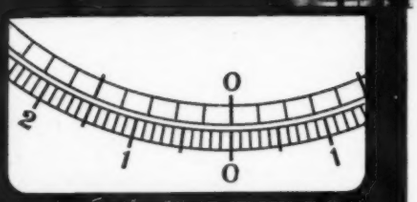
Time was when we identified machines and equipment by serial numbers or plant numbers stenciled on the body of the machine.

However, grease and other foreign matter obliterated these markings, causing difficulty in exact identification of the machine—very often just at the time that this information was needed quickly.

We decided to mark machines, once and for all, with a generous deposit of weld metal in the form of the letters and numerals desired. It is impossible to deface or obliterate this form of marking.

After we had hit upon this method, we noticed that we had had some complaints

Gage Electronically



You will SAVE MONEY and IMPROVE QUALITY with This Gage -

It's versatile, exceptionally accurate, sensitive, and very fast

USE this truly Electronic Comparator in both your shop and laboratory. Small shops find this versatility a big asset. You get two gages for the price of one.

In your laboratory, its exceptional accuracy and extreme sensitivity, the highest of any comparator on the market, will enable you to make the most precise measurements. You can check your most accurate gage blocks and masters.

It has a choice of four differently graduated scales. You are not limited to a single scale. You can read any value from .000010" to .003". Minimum contact pressure is only 1½ ozs.

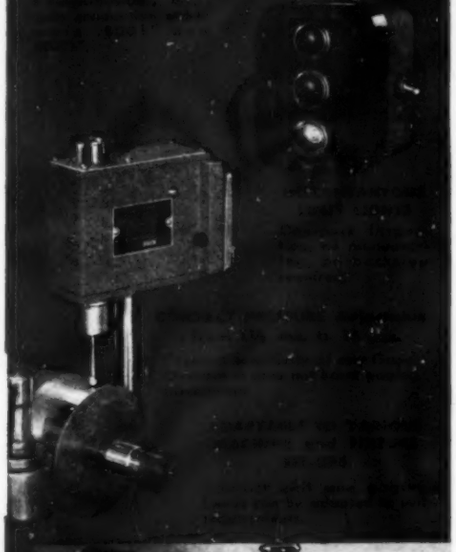
You can take it out into your shop, and with a flick of a switch it is ready to inspect production having any tolerance from the finest you will ever require, to the widest.

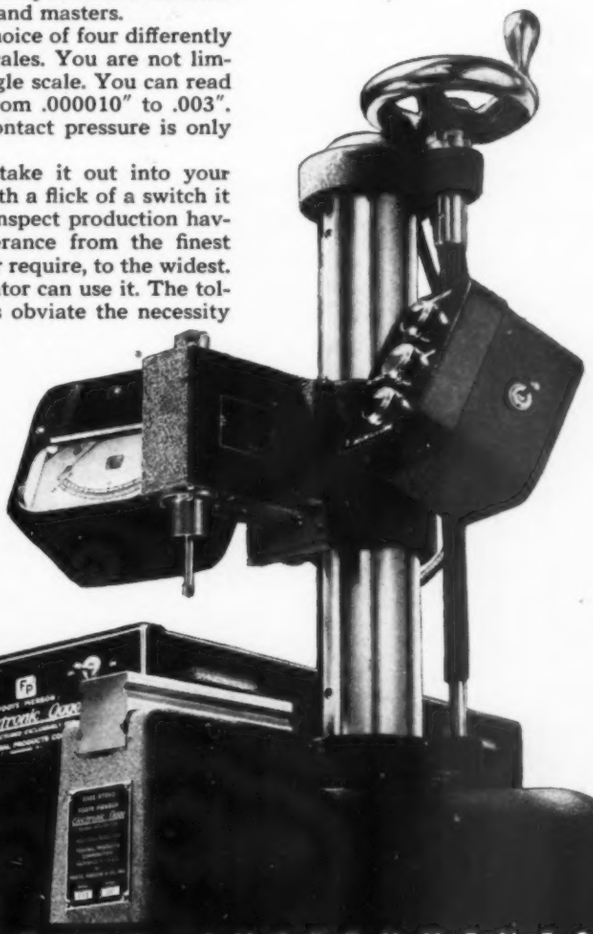
Any operator can use it. The tolerance lights obviate the necessity of reading the dial. And he can't hurt it by forcing the contact spindle.

It is adaptable to various set-ups on any machine or gaging fixture.

We will tell you more about it if you will write —

FEDERAL PRODUCTS CORPORATION
1144 Eddy Street
Providence 1, Rhode Island





FOOTE PIERSON
Electronic Gage
MANUFACTURED EXCLUSIVELY FOR

FEDERAL

PRECISION MEASURING INSTRUMENTS

from customers that specially fabricated steel parts which required piece marks were being received with the painted marks rubbed off in shipping. Therefore the method of welding on identification was adapted to products as well as to our own machines.

Another advantage has shown up. Products that require painting need not be "nursed" in process to keep them from getting mixed up, because the marks show up clearly through the paint. Also, with galvanized parts, since the zinc fills up an ordinary imprint from a steel stamp, and painted marks burn off, this method has proved valuable.

It takes very little time for an efficient welder to deposit the marks on work or machine—and the saving in time and annoyance is considerable.

•

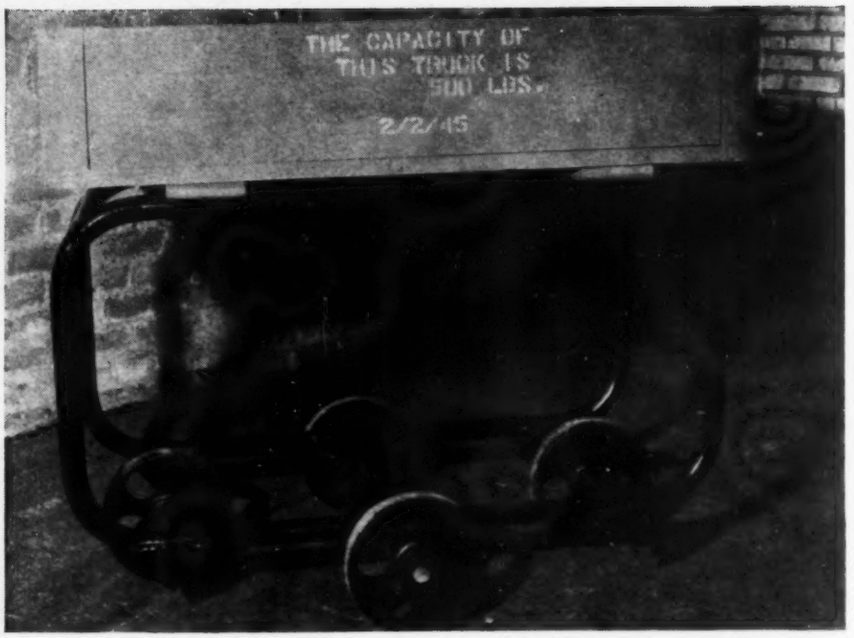
Making Repairs on a Broken Crankshaft

L. KASPER, Philadelphia

The crankshaft of a punch press was broken on the crankpin, as shown in Figure 1 in the sketch. Because it would have required months to obtain a new crankshaft, it was decided to employ the method of repair described below.

A new crankpin was turned in a lathe, with the webs or cheeks of half the original thickness. The original shaft was cut apart, and the webs were reduced to half the original thickness. A hub was turned on each of the webs of the new crankpin, and corresponding recesses were turned in the web ends of the shaft sections, in order to insure perfect alignment. Keyseats were cut in the mating surfaces, two tight-fitting keys being used to carry the load.

The parts before assembly are illustrated in Figures 2 and 3. Figure 4 shows the completed repair, with the parts fastened together with socket-head capscrews.



General-purpose truck, capable of carrying 500 pounds, was built largely from scrap material to meet immediate needs. It stands 36¾ inches from the floor to top of box, which is 3 feet, 2 inches long, 25 inches wide, and 8 inches deep

Factory Truck Utilizes Scrap Material

H. M. BRADLEY, Plant Engineer, Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

Immediate need for a light but strong general-purpose truck was met by building a few of the design shown in the illustration. Much of the material that went into the trucks was scrap, particularly the pipe side-pieces. All the work was done in the maintenance shop.

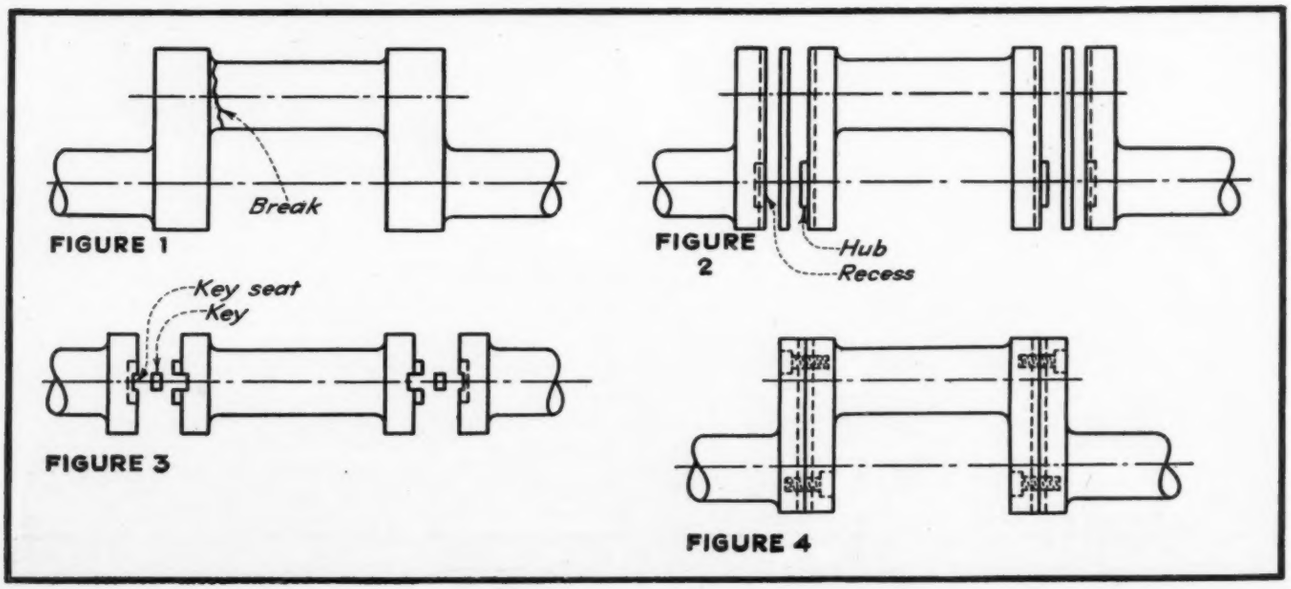
These trucks are 36¾ inches high from the floor to the top of the box, which is 3 feet, 2 inches long, 25 inches wide, and 8 inches deep, outside dimensions. The boxes were made of ⅞-in. basswood.

The frames or side-pieces were made of 1-in standard black pipe or conduit.

Wheels are cast iron 8 inches in diameter with a 2-in. face. They were bored for a running fit on the 1-in. cold-rolled steel axles. Pressure grease fittings in the hubs were provided for lubrication.

All metal parts were welded together.

The date of construction was stenciled on each truck in order to find out how long they can be used before repairs are needed.



HOW RCA TUBES INCREASED OUTPUT OF PLASTIC PARTS 400%

Electronic Preheating Cut Rejects, Shortened Operational Time, Simplified Molding of Intricate Plastic Parts at Kurz-Kasch

This 2000-watt RCA electronic generator can preheat one pound of plastic molding material to 275°F in about 40 seconds

IN July 1943, Kurz-Kasch, Dayton, Ohio, plastics molder, was called upon to deliver a large quantity of high-priority molded pieces within a few weeks. Because the pieces were difficult to mold, rejects due to poor preheating ran as high as 65%; production of the required quantity seemed impossible to achieve in the time available.

Electronic Preheating Tried: Tests were made with electronic preheating, and the method proved successful. In actual practice, electronic preheating cut overall operational time by 50%. Thus, disregarding rejects, production would have been doubled. But, the reduction in rejects brought the total usable output to *5 times its former level*—a 400% increase!

Job Details: The material used in this molding job was Melmac No. 592. The preforms weighed 370 grams, measured 4 inches across and 1½ inches in thickness. A large number of metal inserts were included. Electronic preheating time was only 45 to 50 seconds.

How Electronic Heating Works: By means of RCA electron tubes, 60-cycle commercial power is changed to power at a frequency of several million cycles per second. When this power is passed through the preform it generates heat *within the preform*.

Advantages of Electronic Preheating of Plastics: Heat is instantaneous and uniform throughout the preform pellet. When the power is shut off, heating stops immediately; there is no residual heat to coast temperatures beyond desired limits. With thermosetting plastics, which set with the application of high temperatures, the quick heating possible with electronic heat permits greater workability and results in fewer rejects. Production-line techniques can be employed, cutting processing time to a few minutes—or even seconds.

Working conditions are improved because no excess heat is dissipated into the work area; there are no gases or vapors to contend with. Electronic heating is noiseless, vibrationless, requires no special foundation or installation expense, and takes little floor space. Electronic-heating equipment is also a high-power-factor (90%) load on the plant electric system.

Turn to Electronics for Solution of Your Own Problems: For information on the electronic-heating equipment used in this application, write to RADIO CORPORATION OF AMERICA, Electronic Apparatus Section, Camden, N. J.

Electron tubes are providing a practical solution to hundreds of diversified manufacturing problems—process control, machine control, heat-treating of metals, plant protection, and a host of others. Consult with RCA tube-application engineers for information or advice on the application of electron tubes in your own plant. For examples of electronics at work in industry, send for a copy of the free booklet, "16 Examples of Electron Tubes at Work In Industry." Write to RCA, Commercial Engineering Department, Section I-12A, Harrison, N. J.

The Fountainhead of Modern Tube Development Is RCA

TUBE DIVISION

RADIO CORPORATION of AMERICA

HARRISON, N. J.

Now you can fasten V-Belts by using . . . .

ALLIGATOR

TRADE MARK REG U.S. PAT OFFICE

V-BELT FASTENERS

• **Alligator V-belt Fasteners and the open-end V-belting now being made by belting manufacturers, will enable you to make up multiple V-belt drives from roll belting. These fasteners have been on the market 9 years and are now being used on a wide variety of drives.**

Available for B, C, D sizes of belt for industrial use and 1-in. and 2-in. sizes for railroad use. These fasteners, however, should not be used for repairing endless cord V-belts.

Bulletin V-205 will give you complete details as to where and how these fasteners are used, sizes, list prices, tools and application instructions. A copy will be mailed at your request.

Order from your supply house

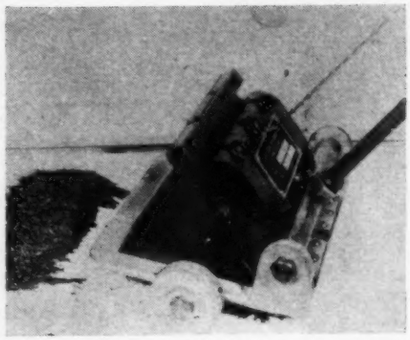
FLEXIBLE STEEL LACING CO.
4678 Lexington Street, Chicago 44, Illinois

Also sole manufacturers of Alligator Steel Belt Lacing for flat transmission belts and Flexco HD Belt Fasteners and Rip Plates for fastening and repairing conveyor belts.

WHAT'S NEW IN EQUIPMENT

Floor Sweeper

Magnetic floor sweeper consists of a non-metallic framework mounted on wheels. Has a permanent magnet hinged to it at one end. Between magnet and floor a fixed sheet of plastic is positioned. As sweeper is pushed along floor near drills and punch presses and



under lathes, all ferrous material clings to the plastic sheet. Operator then pushes sweeper over a piece of paper or a disposal hole in floor, and raises magnet by a lever and chain attached to handle of sweeper. The tramp-iron, filings, chips, and scraps collected then drop off the plastic sheet, and magnet is lowered into working position again. Sjöström Machine Co., Lawrence, Mass.

Fork Truck

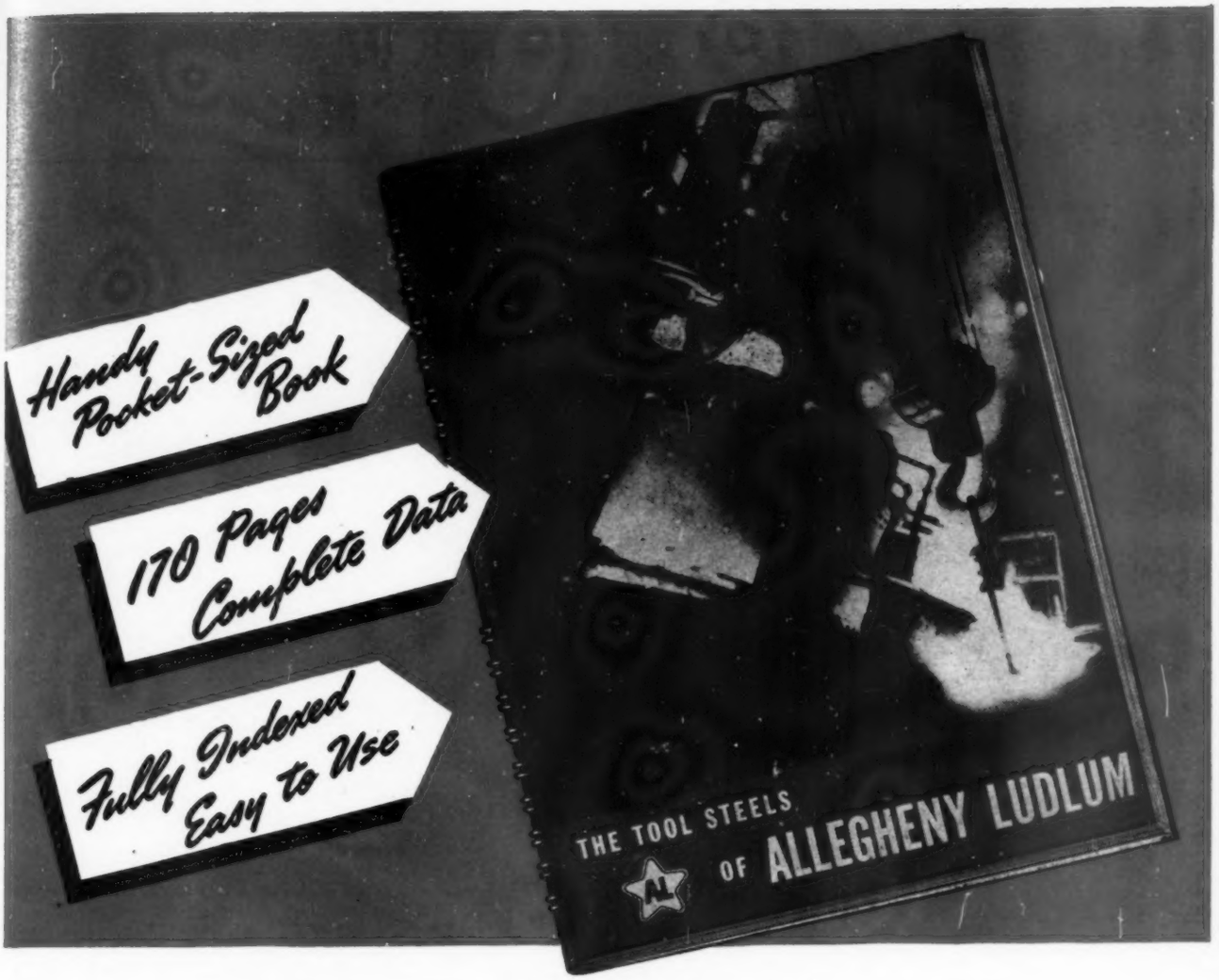
A 4000-lb. capacity truck, known as the Type AIMH articulated fork truck, is designed for warehouse operation. Steering is accomplished by "articulating" or hinging the frame, permitting swinging the load to line it up in position without lining up truck itself. This enables truck to operate in narrow aisles, place loads at right angles to aisles, and require minimum clearance on turns. All electric controls, together with the hydraulic pump, pump motor, steering, lifting, and tilting valves, are grouped in panel box. Power equipment consists of standard battery enclosure with removable top and side plates. Frame is high-tensile steel. Welded steel fork carriage lifts vertically on ball-bearing rollers in steel channel upright guides. Baker Industrial Truck Div., The Baker-Raulang Co., 2168 West 25th St., Cleveland 13.

Soapless Cleaner

All-purpose soapless cleaner, called K.P., suds in hard, soft, or sea water. Applications range from woolens to cutting away grease and grime from engines. Contains no abrasive, and is soluble. Prepared in powdered form, and packed in 50-lb. cartons and 350-lb. drums. K. P. Chemical Co., 16 West 46th St., New York.

Floodlight Lamps

Clear, reflector, and projection type floodlight lamps, for indoor and outdoor service, on 115-, 120-, and 125-volt circuits, are announced. Ratings of the clear types, for operation with reflectors, range between 250 and 1000 watts, with average rated life of 800 hours. Inside frosted reflector types, rated at 150 and 300 watts with 1000



THE ANSWERS TO ALL YOUR NEEDS IN

TOOL AND DIE STEELS . . .

★ HIGH SPEED STEELS
★ HOT WORK STEELS
★ SHOCK RESISTING STEELS
★ COLD WORK STEELS
★ CARBON STEELS
★ HIGH SPEED AND TOOL STEEL FORGINGS
★ CAST-TO-SHAPE TOOL STEELS
★ COMPOSITE DIE STEELS

TO MEET ANY REQUIREMENTS

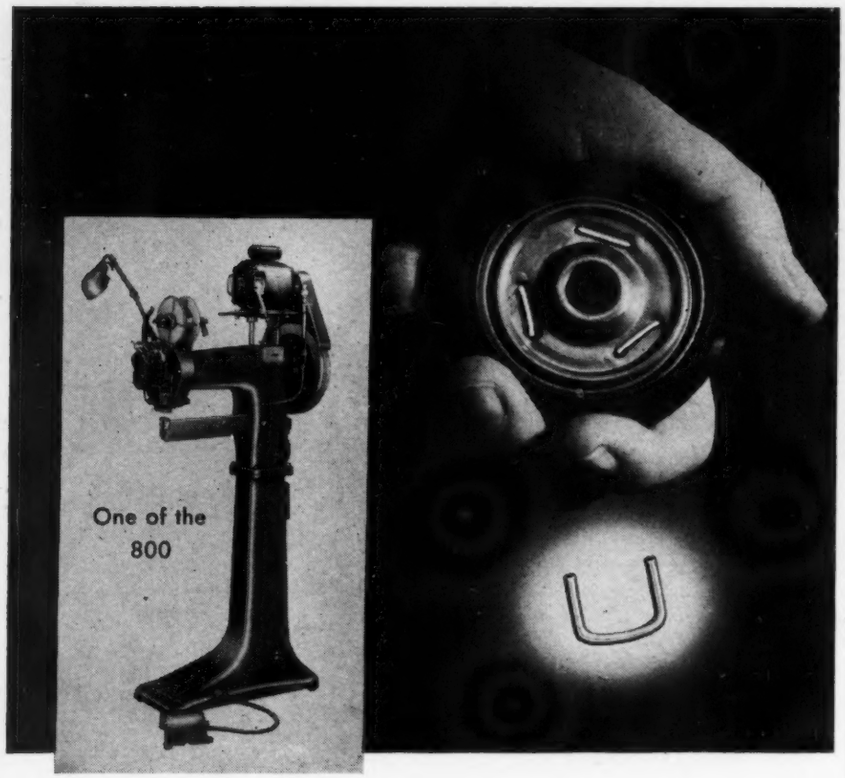
TODAY—and for a long time to come—the premium on production cost-saving is greater than ever before. Match up each one of your machine operations with the tool or die steel that will do the job faster, better, or with less "down" time. This new booklet gives you complete information on the exceptionally large family of Allegheny Ludlum Tool Steels—invaluable data on properties, uses, selection and handling that every production man should have.

write for your copy . . . Address Dept. FM-37

ALLEGHENY LUDLUM

STEEL CORPORATION · General Offices, Brackenridge, Pa.

Pioneer in Specialloy Steels



Suppose Bostitching could halve your cost, too...

Three Bostitch staples . . . stitched through two thicknesses each of metal and leather . . . assemble a grease gun packing with a saving in time and materials that amounts to one-half the cost of using a bolt-and-nut fastening.

In thousands of other cases, too . . . from the potato chip manufacturer for whom Bostitching saves 15¢ per M in bagging . . . to the big rubber company that shortens by 45% an operation manufacturing puncture-proof gas tanks . . . Bostitch demonstrates how it saves fastening costs.

Metal, paper, wood, leather, plastics, rubber . . . in any combination . . . can often be fastened . . . by Bostitching . . . with more speed . . . and sometimes more security and better appearance . . . than by nailing, tacking, gluing, riveting, taping.

New folder 188 gives you information about representative Bostitch models and may suggest an application *you* can use to speed fastening and lower costs. Write, today.

BOSTITCHING
offers you the most in stapling

Experience... 1896 50 years specializing in fastening

Engineering... 18 research engineers

Selection... Nearly 800 models

Service... 91 offices, over 200 Bostitching specialists — increasing as products and trained men become available.

BOSTITCH
fastens it better, AND FASTER with wire
ALL TYPES OF STAPLES APPLIED BY MACHINES
ALL TYPES OF MACHINES FOR APPLYING STAPLES

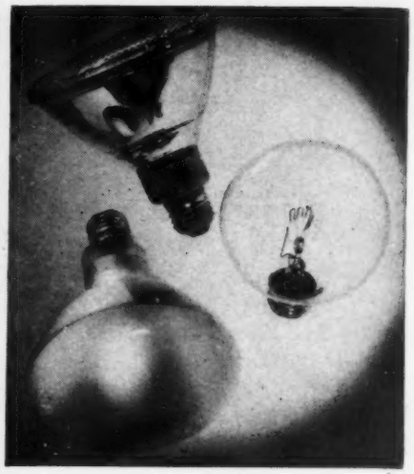
Bostitch (Boston Wire Stitcher Co.), 68 Blackmore St., East Greenwich, R.I. (Bostitch-Canada, Ltd., Montreal).

Please send Folder 188 on Bostitch time-and-money-saving applications to:

Name.....

Company.....

Address.....



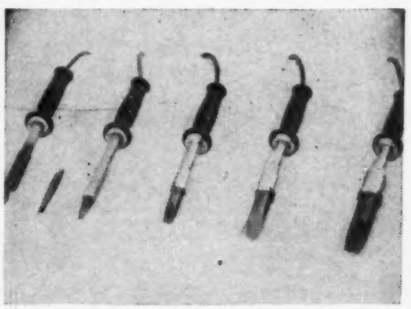
hours' average life, provide means of flood-lighting large areas with controlled light. Projector flood types, rated at 150 watts and 1000 hours' average life, are suitable for outdoor use. Inbuilt reflectors and special hard glass resist rain, snow, and other outdoor weather conditions. Clear and reflector types, rated at 400 watts or less, are supplied with medium bases. Mogul bases are furnished for higher wattages. Projector flood types are supplied with medium skirted bases. Sylvania Electric Products Inc., Salem, Mass.

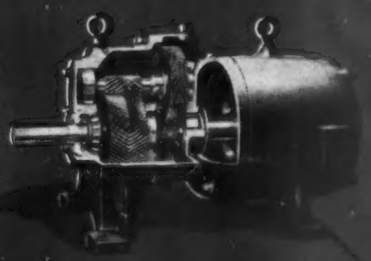
Asbestos Gaskets

Palmetto high-pressure folded asbestos gaskets are for handholes, manholes, and tube plates of boilers and other apparatus subject to heat and pressure. Each gasket is hand-locked to size, and seam is on outside, away from the pressure. Gaskets, made from brass wire-inserted asbestos yarn, coated and cemented with heat-resisting compound, provide resilience and compressibility, maker states. The woven cloth from which gaskets are made also is available in sheet form, supplied with heat-resistant coating. Suitable for cutting gaskets for cylinder heads of gas, oil, and steam engines, and similar services. Gasket tape is made from the same cloth, coated with heat-resisting compound, and can be used for making gasket strips. Greene, Tweed & Co., 238th St. and Bronx Blvd., New York 66.

Soldering Irons

Ranging from 75 to 300 watts in size, and with tips from ⅜- to 1¼-in. diameter, irons are designed for severe and exacting soldering operations where fast, continuous soldering is required. They feature quick





the RIGHT *horsepower*
the RIGHT *shaft speed*
and RIGHT *where you want it*

That's the horsesense way to use horsepower. See how the designer of this cement cooling equipment has secured power right where he needs it . . . and at exactly the right speed. Easy to order, easy to use, he has saved himself time, space and money by using these compact, integrally built power units. How else could he have secured such a clean cut, economical design.

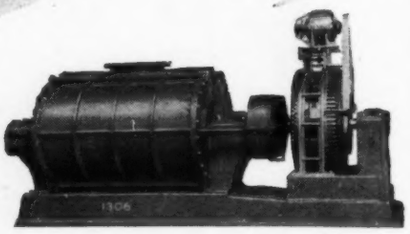
And nowhere, but in the Master line of Gearmotors, could he have found power units that are so flexible, so easily adaptable and in such a wide range of sizes and types. They are available in any size, 100 HP and smaller . . . for all cycles, phases and frequencies . . . in open, splash proof, totally enclosed, fan cooled and explosion proof types . . . with Speedrangers (mechanical variable speed) and Unibrakes . . . for every type mounting.

Increase the salability of your motor driven products . . . improve the economy, safety and productivity of your plant equipment, with Master Gearmotors . . . the horsesense way to use horsepower.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

MASTER

GEARHEAD MOTORS



Size makes no difference in the quality of R-C blowers. Our smallest size, of 10 CFM capacity, gives the same satisfaction as this big 12,000 CFM unit.

• Nature couldn't change the air for men working inside the Continental Divide tunnel on the great Colorado-Big Thompson irrigation project. Eight miles was many times too far for fresh air to drift in and foul air to work out. Man-built wind-makers went to work.

Through a single 20" pipe line, huge Roots-Connersville blowers alternately supplied fresh air and exhausted foul gases from the face, after blasting. The entire 8-mile length of the east bore (2½ miles longer than driven in any previous tunnel), was kept well-ventilated by a series of R-C blowers, electrically controlled to maintain balance, either blowing or exhausting. The 5-mile bore from the west, driven by another contractor, was similarly ventilated by Roots-Connersville blowers.

R-C equipment is also profitably used for moving air, gas or liquids in small or large quantities. Some applications are:

Pneumatic conveying systems	*Grain conditioning*
Supercharging Diesel engines	*Insulation blowing*
Acid-making processes	*Water distillation*
Manufacturing explosives	*Transporting live fish*

Roots-Connersville *dual-ability* to engineer and build equipment for your specific needs is at your service. Call on us without obligation.

ROOTS-CONNERSVILLE BLOWER CORP.
One of the Dresser Industries
601 Central Avenue, Connersville, Indiana

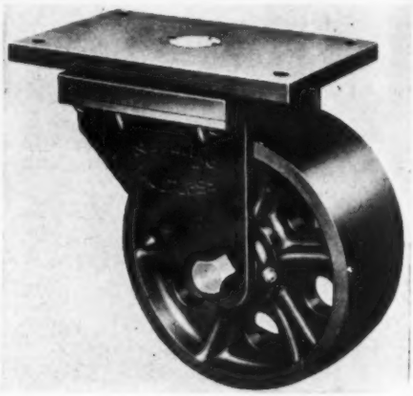
Roots Connersville Since 1854

ROTARY POSITIVE AND CENTRIFUGAL BLOWERS • EXHAUSTERS • BOOSTERS
LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

recovery and high-reserve-heat capacity. Also suitable for light, medium, and heavy intermittent soldering. Incorporate calorized (surface-alloyed with aluminum) copper and 18-8 stainless steel for all parts subject to high temperatures. This, together with use of the replaceable Calrod heating unit, is claimed to assure long life, uniform performance, low maintenance, and to allow convenient renewal. Chisel-shaped copper tips also are calorized, retarding corrosion, and preventing tip threads from freezing to tip holders. Handles are of plastic. Industrial Heating Div., General Electric Co., Schenectady.

Truck Caster

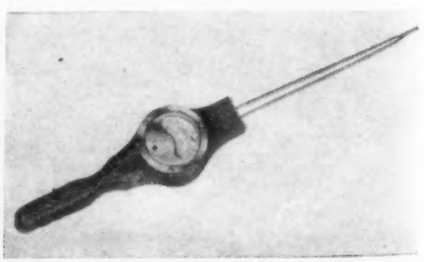
Series 1300 Super-Dreadnaught swivel plate caster, for extra-heavy-duty service, is engineered and finished to machine-tool tolerances. Tapered king bolt head fits in tapered swivel top plate of ¾-in. solid steel. Self-contained swivel load bearing is a high precision thrust type, with ½-in.



diameter ball bearings operating in 4¾-in. diameter ball circle, with hardened, ground, and polished raceway. Assembled as complete unit with steel retainer ring, which protects ball and bearing surfaces against dirt. Alemite pressure fittings provide lubricant to all bearing surfaces of swivel and wheel. Caster has Timken combined radial and thrust bearing. Outer raceway of bearing seats in machined recess in tank type heavy steel horn top plate. Heavy-duty wheel is heat-treated, machined, controlled metal alloy casting, with flat tread to protect floor surface. Caster has load capacity to 18,000 pounds. Faultless Caster Corp., Evansville 7, Ind.

Hand Pyrometers

Xactemp pyrometer, designed for use with most types of thermocouples, is stated to give instant and direct readings, accurate to within a fraction of a scale division. Suitable



First Aid to Reconversion

THE INDUSTRIAL DISTRIBUTOR

"Quick" is the word that means everything in the change-over to peacetime manufacturing. Rearrangement of machines, relocation of drives, remodeling of departments or a whole plant, installation of new equipment—all of these call for a multitude of supplies overnight. Thousands of jobs—to say nothing of earnings—depend on speed.

It is the unique service of the Industrial Distributor to furnish needed articles from stock, *quickly.* Take fastenings, for example, which are required in great variety both in factory alterations and in production operations. The Industrial or Mill Supply Distributor is ready with a complete stock of bolts, nuts, screws and other fastenings to take care of any emergency as well as for regular maintenance.

With the "National" line of fasteners, he has both dependable quality and the most complete line made by one manufacturer.

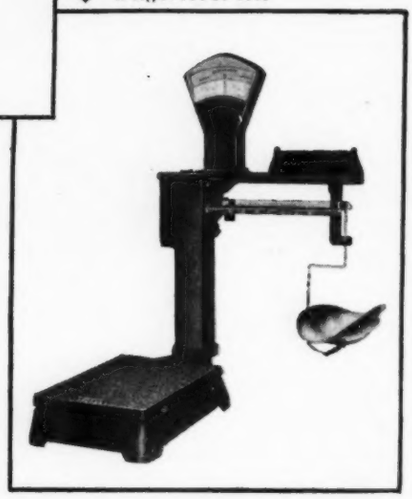
National
HEADED AND THREADED
PRODUCTS

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

Sensitive Scales
LOOK WHAT THEY DO!

Model #66-02—Capacity . . . 6 lbs.—Sensitivity . . . 1/64 oz. — Ratio . . . 1:1, 10:1 and 50:1 — Shipping Weight, 60 lbs.

Model #1743—Capacity . . . 200 lbs. — Ratio . . . 50:1 (and special tray for odd counts)—Beam . . . 5 lbs. x 1/2 oz.—Shipping Weight . . . 87 lbs.



- REVEAL SHORTAGES
- PROVIDE QUICK, CORRECT INVENTORY
- ASSURE PERFECT COUNT OF KNOWN AND UNKNOWN QUANTITIES
- CHECK DAILY PRODUCTION
- SAVE LABOR TIME
- REDUCE PARTS AND MATERIALS HANDLING
- HELP MAINTAIN PERPETUAL INVENTORY
- HELP DETERMINE PIECE-WORK PAYMENTS
- HELP IN JOB EVALUATION

YES, DETECTOGRAM SCALES ARE INDUSTRIAL MACHINERY

Write today for further information

DETECTO SCALES INC.

201 MAIN STREET BROOKLYN 1, N. Y.

SCALE ENGINEERS IN ALL PRINCIPAL CITIES

for checking surface temperatures in heat treating and fabrication applications. Of cast aluminum and brass construction, it is balanced, and needs no adjustments. Indicator is provided with an Alnico V magnet, and has scale starting at 50 deg. F. Indicator is of medium resistance, not affected by thermocouple length. A pyrometer for nonferrous molten metals has 43-in. stainless steel extension and a standard 7-in. Marshall tip, which permits readings to be taken below the surface of the metal. Has a 3½-in. scale reading from 50 to 2500 deg. F. Claude S. Gordon Co., 30th & Wallace Sts., Chicago 16.

Portable Fire Extinguisher

Carbon dioxide hand fire extinguisher with quick operating features is announced. Container holds 4 pounds of carbon dioxide, and comes with carrying handle and control button designed for fast operation. It can

be carried in one hand, with thumb of carrying hand operating the pushbutton. A horn swivel raises or lowers as needed, remaining in lower position when attached to the wall rack, which is furnished with the extinguisher together with quick-release chain. Painted vivid orange and black for high visibility, the extinguisher may be recharged at regular refill service establishments. The B. F. Goodrich Co., Akron.

Sound Film Projectors

Model 201 16-mm. sound film projector, for industrial training, sales meetings and promotion, and other uses, is equipped with a 20-watt audio amplifier. Features sound stabilizer, friction-drive even-tension take-up, and a removable film gate. The sound stabilizer is an oil-driven flywheel, smoothing out film speed variations for sound scanning. The take-up is belt-driven. Friction-drive consists of two concentric cylinders, outer cylinder driving inner one through friction on a layer of felt. Film gate can be lifted and slipped out of the projector with one hand, enabling film pressure shoes and aperture plate to be cleaned. Pilot pin construc-

The First Step in Reconversion

Look at your Bearings

The operating schedules of the past four years have been exceedingly hard on machinery and equipment. And there is no let-up in sight. The demands of peace will be equally as heavy. Wise manufacturers will make sure that everything is in top shape when they reconvert. They will *prevent* trouble . . . rather than cure it. The first step is to check the bearings. When replacement is necessary . . . try Johnson UNIVERSAL Bronze. Every bar is completely machined . . . entirely usable from END to END. Every bar is cast in the highest quality bearing bronze alloy available. Your local Johnson Distributor is ready to give you excellent service on over 350 sizes. Why not call him in—TODAY?

JOHNSON BRONZE CO.
512 S. MILL STREET · NEW CASTLE, PA.

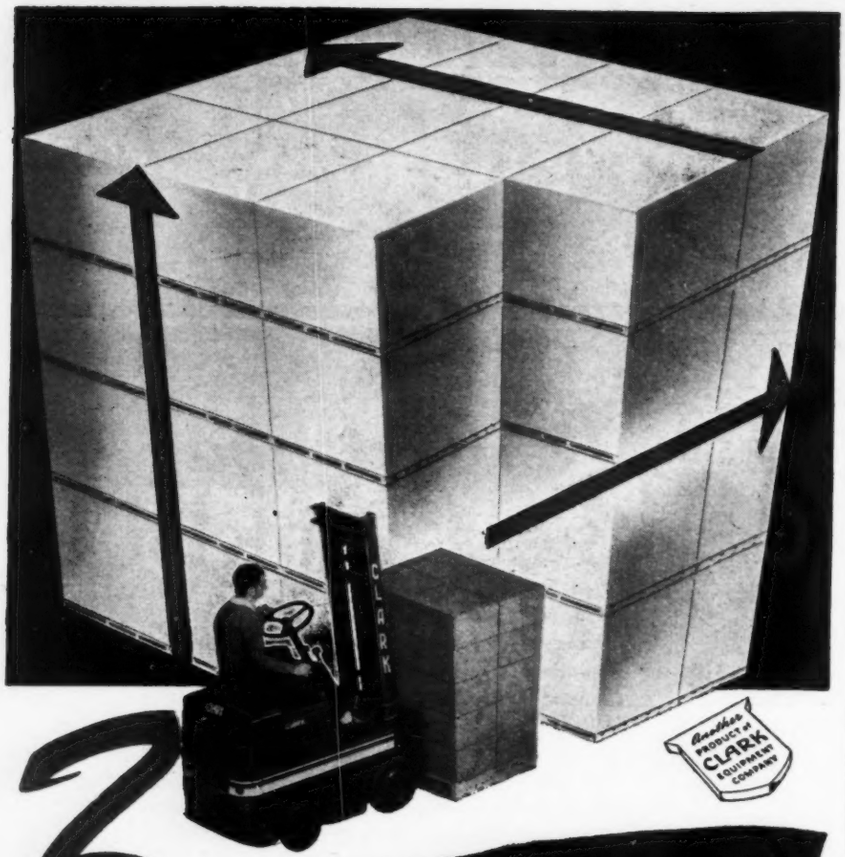
Look for this Label...

JOHNSON UNIVERSAL BRONZE

It's your guarantee of
Top Quality

JOHNSON
SLEEVE BEARING HEADQUARTERS
BRONZE

BRANCHES IN 18 INDUSTRIAL CENTERS



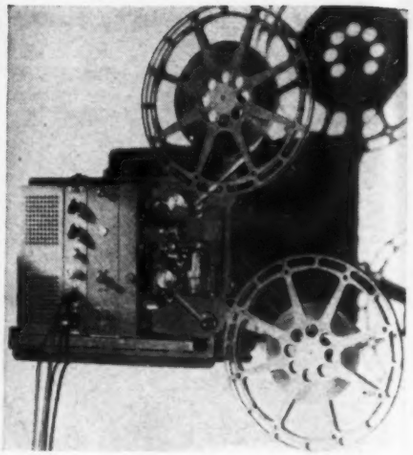
3 DIMENSIONAL USE OF SPACE THROUGH THE TIERING SYSTEM!

CLARK fork trucks utilize all factors in material handling

- ✔ High stacking utilizes "ceiling heights" or "air rights."
- ✔ Speed in handling utilizes time.
- ✔ 24 hour a day performance utilizes round the clock availability.
- ✔ Low cost operation and long life utilize savings on investment.
- ✔ Clark Fork Truck performance utilizes all factors in material handling.

CLARK
TRUCTRACTOR, BATTLE CREEK, MICHIGAN

Products of CLARK • INDUSTRIAL TRUCKS AND TRACTORS • BOOSTER UNITS • EASY ROLL TRAILER AXLES AXLES FOR TRUCKS AND BUSES • GEARS AND FORGINGS • ELECTRIC STEEL CASTINGS • METAL SPOKE WHEELS TRANSMISSIONS • AXLE HOUSINGS • RAILWAY TRUCKS • BLIND RIVETS • HIGH-SPEED DRILLS AND REAMERS



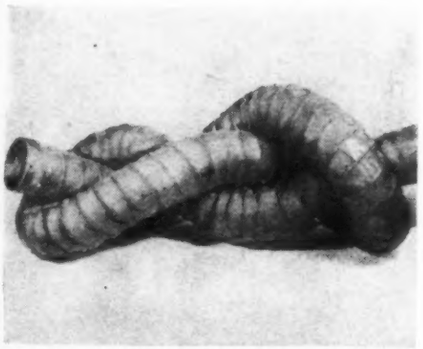
tion gives correct alignment when gate is replaced, and operation is accomplished without disturbing initial focus. Projector has large slow-speed sprockets, and an embossed threading line provides a guide for the exact length of upper and lower loops which can be followed, even in the dark. RCA Victor Div., Radio Corp. of America, Camden, N. J.

Arc Welding Compound

Developed to aid in instantaneously creating and maintaining a metallic welding arc where low currents and small-diameter electrodes are employed, arc welding compound is now on the market. Known as Strike-Easy, it is easily applied, and can be used on any kind of metal with any type of electrode, the maker says. The compound, in paste form, is available in 1-lb. glass jars, ready for use. Electric Welding Div., General Electric Co., Schenectady.

Flexible Tubing

Non-collapsible under plus or minus pressures, flexible tubing is retractable to about one-eighth its extended length. Applicable for portable or semi-permanent ventilation or handling of air, gases, or light solids. Spring steel helix core causes it to spring



out to its fully extended length, in which position it stays, whether working on pressure or suction. A feature of tube construction is method of spiral-stitching spring core in fabric. Inside surface is free of wire ridges, providing less resistance to air flow, and no obstruction to passage of solids. Sharp bends can be made with only slight reduction of air flow, and without the use

Easy to Check Machine Speeds with Stewart-Warner Portable Hand Tachometer #757-W

THIS RUGGED, inexpensive, precision-built instrument is ideal for production engineers, maintenance superintendents, foremen, shop mechanics and service men. In a matter of seconds you can check the speed of machines, whether revolutions are clockwise or counter-clockwise.

Check-control of machines is vastly important in these days of speedy production of consumer goods. The Stewart-Warner Portable Hand Tachometer enables you to be *sure* you are getting maximum efficiency from your machines, a mighty potent factor in meeting competition.

This handy tachometer comes ready to use, with two tips. One, for shafts having a center hole. The other for measuring the speed of flat shafts, pulleys, etc. Easy to use, requires no attention, and checks speeds from 100 to 4000 R. P. M.

You need Stewart-Warner Portable Hand Tachometers in your plant. Write for complete details, today.

Stewart-Warner Portable Hand Tachometers come ready to use, packed in a carton that can be retained and used as a case for the instrument. Included are two tips – (No. 1) for shafts having a center hole – (No. 2) for measuring speed of flat shafts, pulley, etc. Price only $9.50 each.

STEWART-WARNER
Industrial Tachometers

Stewart-Warner Corporation
1870 Diversey Parkway, Chicago 14, Ill.

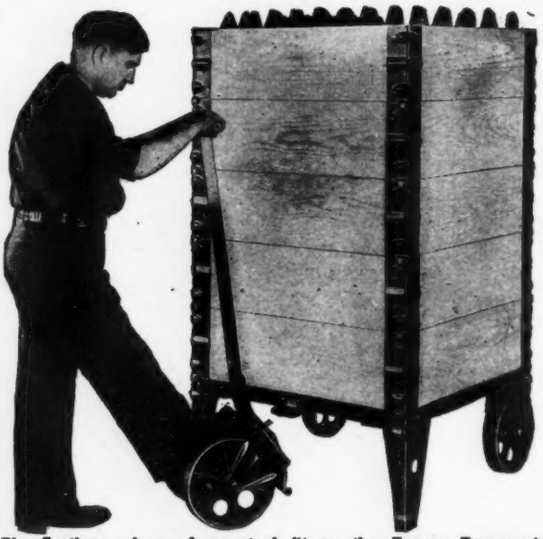
Another Product of
STEWART WARNER

The Judge Says:

60 DAYS FREE TRIAL

without Penalty or Obligation
if you've been GUILTY of NOT using the

TURNER SYSTEM
OF MATERIALS HANDLING



Bin Sections of wood or steel fit on the Turner Transport. Capacity is increased or reduced as needed. Loaded Transport easily moved with the Jimmy.

Frankly, it's no joke! Without the TURNER SYSTEM you have failed to utilize a method which has saved up to 50% in Labor Cost, Floor Space and Equipment Cost for hundreds of leading manufacturers.

We are so sure that you can benefit as well from the use of this system that we are willing to ship an assortment of standard units for 60 DAYS FREE TRIAL. Use them for at least two months. Keep them if (in your opinion) they save labor, time, and space. Return them if they don't. There is absolutely no obligation, except that you assume nominal transportation charges.

TURNER SYSTEM
Described
in Book

A copy of a 20 page book outlining the whole story of the TURNER SYSTEM will be sent without charge if you will write for it on your letterhead.

FLOOR PLATE DECK TRANSPORT provides point contact with hot materials. Non-skid embossments hold materials on deck.

FACTORY SERVICE COMPANY
4605 N. TWENTY-FIRST ST. MILWAUKEE 9, WISCONSIN

of elbows or special fittings. Lighter than metal duct or molded tubing, and takes up less space when retracted. Made of long-fiber duck, havings bursting strength of 170 p.s.i., the fabric is processed for fire resistance, and covered with thermoplastic. The Warner Bros. Co., Spiratube Div., Bridgeport, Conn.

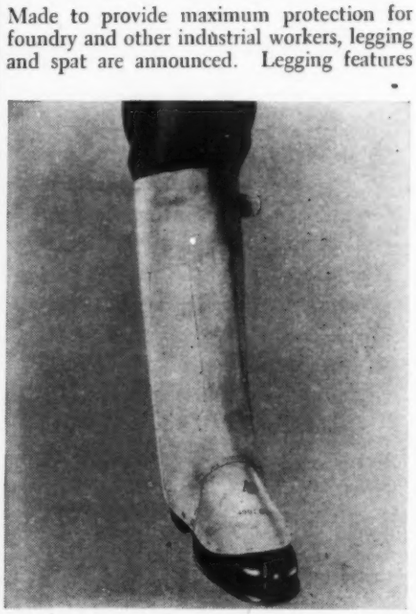
Electric Immersion Heater

Chromalox Type DH electric immersion heater has been designed for heating greases, solid oil, and other compounds supplied in 55-gal. drums or similar containers. Uniform heating of material is secured by placing heater in drum and allowing it to melt

its way to bottom. Adjustable thermostat limits operating temperatures if heater is unattended while in operation. Has large circular heating element. Steel risers allow electrical connections to terminate in standard conduit box. Eyebolt at top of assembly permits easy handling. Weight of heater aids its descent in drum. Available for 115- or 230-volt, single phase current in ratings up to 5000 watts. Edwin L. Wiegand Co., 7518 Thomas Blvd., Pittsburgh 8.

Protective Legging and Spat

Made to provide maximum protection for foundry and other industrial workers, legging and spat are announced. Legging features



WHY SPEED NUTS ARE FIRST *with management*

Management in any plant must be concerned particularly with the quality and durability of its product. That is why so many manufacturers are changing over to SPEED NUTS. For SPEED NUTS do more than just hold parts together . . . they improve the quality and prolong the life of the finished product.

Despite the most severe vibration, anywhere along the line from factory to consumer, products remain tightly assembled with SPEED NUTS. The nuisance of tightening or replacing loose bolts and nuts is eliminated, increasing dealer and consumer satisfaction.

SPEED NUTS protect the product against damage, too, for the same spring tension that produces the exclusive SPEED NUT lock also provides a resiliency that absorbs expansion and contraction, vibration and shock, even preventing damage to porcelain enamel, glass or plastic parts.

Write for literature today and you'll soon be assembling the SPEED NUT way.

NOTHING LOCKS LIKE A SPEED NUT

Only SPEED NUTS provide a COMPENSATING thread lock and a SELF-ENERGIZING spring lock. As the screw is tightened the two arched prongs move inward to lock against the root of the screw thread. These free-acting prongs COMPENSATE for tolerance variations. Compression of the arch in prongs and base creates a SELF-ENERGIZING spring lock. These two forces combine to definitely prevent vibration loosening.

TINNERMAN PRODUCTS, INC. • 2096 Fulton Road, Cleveland 13, Ohio

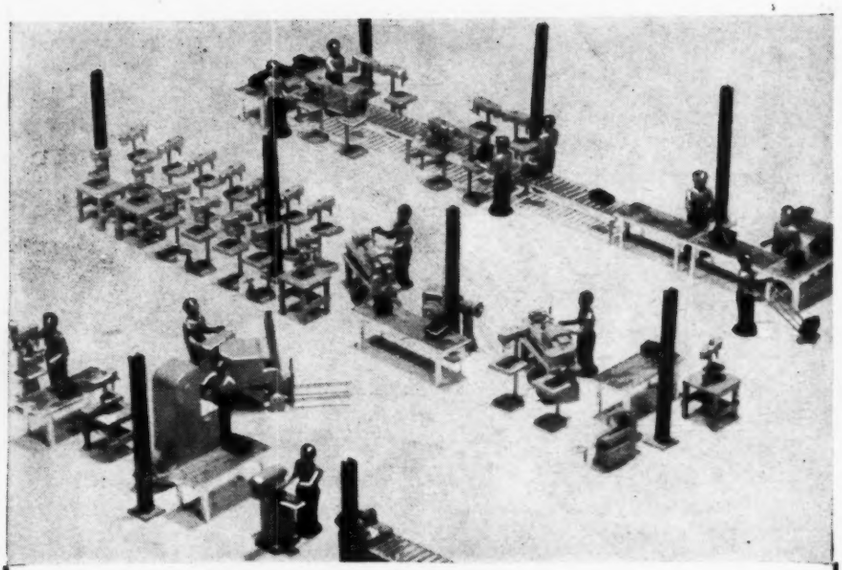
In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In France: Aerocessoires Simmonds, S. A., Paris

In England: Simmonds Aerocessories, Ltd., London
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne

Speed Nuts* PATENTED

*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS . . . OVER 3000 SHAPES AND SIZES



Make Your Plant Layouts

EASILY . . . QUICKLY . . . ACCURATELY

With

MONROE MINIATURE MODELS

Custom Built to Your Scale

The use of custom built models for production planning is proving the most efficient and economical method of making reliable plant layouts.

Models insure the best arrangement of machines, equipment and men—permit more accurate analysis of your problem—and offer many other cost saving advantages a few of which are listed.

1. **Visually planned projects are easily understood by both engineering and non-technical personnel**
2. **Plant layouts are easily changed by rearrangement of models.**
3. **Plant layouts are more accurate with models.**
4. **Visually planned projects aid in solving safety problems.**
5. **Visually planned projects permit study of color arrangements for bettering working conditions and increasing production.**
6. **Production problems easily discussed and solved through the use of models.**

Use this Coupon

for complete details on Monroe Custom Built Models, their uses and how they can save you time and money in making plant layouts.

Monroe Miniature Modelers furnish custom built scale models of machine tools, equipment and buildings—in fact everything required for a departmental or complete plant layout.

MONROE MINIATURE MODELERS

BOX 374 — MONROE, MICHIGAN

Kindly send me complete information on your scale models for us in making plant layouts

Name .....

Title .....

Company .....

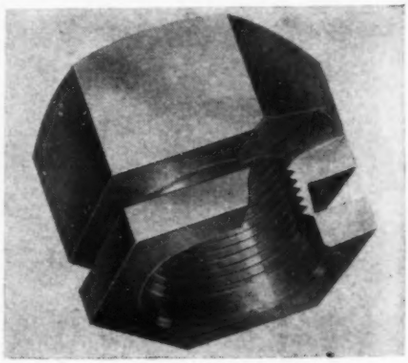
Street .....

City .....**Zone**.....**State**.....

easy adjustment, and quick release. Protects front, back, and sides of leg, from instep to knee. Available in chrome leather, tanned to resist heat and hot metal splashes, and also may be obtained in asbestos or fire-resisting duck. All leggings have chrome leather flare over instep. The spat is identical in construction, but is shorter. Its design provides protection for instep and ankle of worker. American Optical Co., Southbridge, Mass.

Locknut

Known as Klincher, one-piece metal locknut has patented cone grip, which is said to provide pressure needed to eliminate ordinary axial play, and develop a solid grip, without harming the threads. Free from starting torque, it can be applied with fingers to locking position, and then tightened with standard socket or end wrench. It is claimed that cone grip applies pressure evenly around threads at base of nut, preventing leaking, holding locked position permanently, regardless of vibration or bolt stretch; that design provides as high as 20 percent extra thread strength; and that flush seating surface will not gouge or mar. All metal, it is not affected by high or low temperature. Can be plated, sprayed, or painted before or



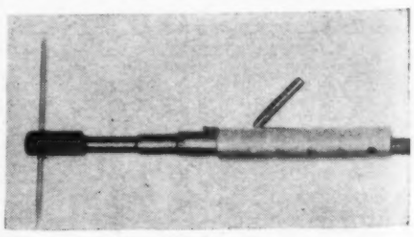
after application. Same height when locked as standard nut and washer, while being applied it has Class 2 fit; when locked in position it has in effect a Class 4 fit. Faultless Caster Corp., Lock-Nut Div., Evansville, Ind.

Change in Ownership

Blaw-Knox Company, Pittsburgh, announces acquisition of all engineering, sales, fabricating, and installation of the Ross Supertherm hot water heating systems in North and South America, from the J. O. Ross Engineering Corporation, New York.

Electrode Holders

Line of air-cooled carbon electrode holders, for manual welding, includes models in four sizes—150, 200, 300, and 500 amps. Holders



If noise is one of your problems, consider the sleeve bearing. The oil film operates silently and insulates against noise transmission. Bunting engineers will gladly discuss specific applications with you. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in principal cities.
Bunting
BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

FOR LONG, RELIABLE LIGHTING SERVICE

When a fluorescent lamp has reached the end of its useful life, the Watch Dog locks out of the circuit. It does not use itself up in vain attempts to relight the dead lamp. Experience has shown that one Watch Dog will outlast five ordinary starters.

Besides conserving the life of the starter, this positive stopping action of the Watch Dog serves two other important purposes. It reduces fluorescent lighting upkeep, as the Watch Dog does not have to be replaced each time a new lamp is inserted. The maintenance man's job is reduced to pressing the reset button on the starter before relamping.

The other purpose served by the lock-out feature of the Watch Dog is elimination of dead lamp blinking. This condition cannot prevail with this starter on the job no matter how long a dead lamp is allowed to stay in the fixture.

For additional information about Watch Dog Starters, write to Section G-163-37, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

feature Hol-Grip design, with ample length as well as ventilation. Average carbon arc welding job is done with either the 13½-oz., 150-amp. holder, or the 20-oz., 200-amp. unit. The two units are furnished optionally with or without special Quick-Attach whip cables for short duration jobs. The 300- and 500-amp. holders are suitable for heavy welding and cutting jobs. Tweco Products Co., Wichita 7, Kan.

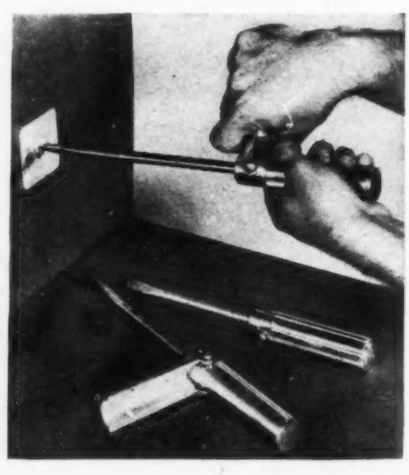
Motor Grease

For lubrication from 13 to 176 deg. F., for all speeds up to 3600 r.p.m., and for horizontal or vertical operation, grease for ball and roller bearing motors is announced. Available in 8-oz. tube, the lubricant is

stable, resistant to oxidation, and remains in a bearing for an indefinite period without drying out, caking, or separating, according to the manufacturer. Tube has large opening in long nasal spout, which fits into ⅛-in. pipe coupling, and has key with which to wind from bottom. Westinghouse Electric Corp., 306 4th Ave., Pittsburgh 30.

Screwdriver

Tuffy, a triple-purpose screwdriver, incorporates aluminum power-arm arrangement, giving extra power to unlock rusted screws. In reverse, it exerts pressure needed to tighten screws. With power-arm folded back into handle, tool becomes a standard screwdriver. Power-arm is constructed to afford a solid horizontal hand support, which allows full hand and body pressure



you wouldn't

hitch a modern train to an ancient locomotive

Nor would you put carbide cutting tools on a lathe that cannot transmit the power to use them at their maximum efficiency. Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Jones & Lamson Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of carbide tools. They have the rigidity, they can transmit the power, they are easy to operate.

In the battle of costs to come, only those who use the most efficient tools and methods will survive. Now is the time to scrap your obsolete machines and replace them with good War Surplus machines or new machines. 'Phone now for one of our engineers to help you choose the equipment that will help you to win in the battle of costs to come.

What HORSEPOWER Are You Using?

Combined cuts like these, require as much as 300 per cent more horsepower with carbide tools than with high speed steel tools, but carbide halves the cutting time.

Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U.S.A.

Turret Lathes

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

CHAMPIONS ALL

Champion Lamps cover the full range for industrial service, including:

CHAMPION *Fluorescent Lamps*

white or daylight, in all standard wattages and lengths; *Instant Start* Fluorescent Lamps for the new instant start circuit; *Low Temperature* Fluorescent Lamps for cold or exposed locations.

CHAMPION *Incandescent Lamps*

clear, inside frost, white bowl and silvered bowl for general lighting service; *Vibration Service* Lamp; *Rough Service* Lamp; *Spotlight, Floodlight* or *Reflector* Lamps; *Infra-Red* Lamps.

Whatever the types and sizes you need, select lamps bearing the CHAMPION Diamond mark, signifying these four "diamond points" of value.

1. **Champion Quality** — guaranteed to equal or exceed Federal Specifications.
2. **Champion Service** — trained lighting experts in the field to help you choose the one best lamp for each and every lighting application.
3. **Champion Economy** — Champion Lamps for industry are designed and distributed to assure minimum lighting cost as well as lamp cost.
4. **Champion Supply**—through carefully selected industrial distributors equipped to meet your needs promptly and efficiently.

CHAMPION LAMP WORKS

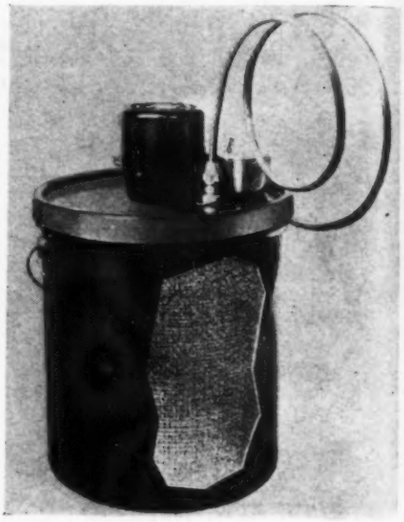
Lynn, Massachusetts

A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO

to prevent slipping or gashing of screw head. Tool has aluminum handle, blade of drop-forged steel, and is plated to prevent rust. Made in 5x$\frac{1}{4}$-in., 6x$\frac{5}{16}$-in., and 8x$\frac{3}{8}$-in. blades. Swallow Airplane Co., Inc., Wichita, Kan.

Central Coolant System

Portable central coolant system is designed to serve as auxiliary tank or as central system for one to seven spindles. Known as Portable Model 127, unit features Strainco-Metex interknit fabric and wire strainer.



High-pressure centrifugal pump is mounted on 5-gal. tank, and provides adjustable flow. System is equipped with Stay-Put flexible tubing and discharge nozzle. The 60-cycle, 1/25-hp. motor is single phase, 115 volts, 1.60 amps. Strainer Products Corp., 75-77 N. Willow St., Montclair, N. J.

Pressure Relief Valve

Type V-105 pressure relief valve operates as a safety valve for vapors and gases, and as a relief valve for liquids. It is of simple construction, with beveled surface for positive, consistently tight seating of valve. Loose threads on nozzle, and reinforcement on lower neck are said to minimize distortion, warping resulting from temperature changes, and other misalignments. High lift and high flow capacity are featured, and the spring is protected against failures resulting from corrosion. Nozzle is extra long, bringing valve seat well above lower part of discharge area. This reduces friction losses when discharging vapors, and, being of top guided construction, coking and sticking are eliminated, according to the manufacturer. Valves have minimum blow-down, provision is made for gagging, and they can be supplied with lifting mechanism. Oceco Div., The Johnston & Jennings Co., Cleveland 14.

Trolley System

Rubber-insulated trolley system, known as TracTroly, is suitable for electrically operated mobile equipment, such as cranes, monorails, and portable tools. Claimed to

The Mark of Quality

The initials "CRL" in the Diamond stand for Centralab

They are an integral part of the Centralab name, and for more than a quarter of a century have represented the utmost in engineering skill and precision . . . the height of manufacturing perfection.

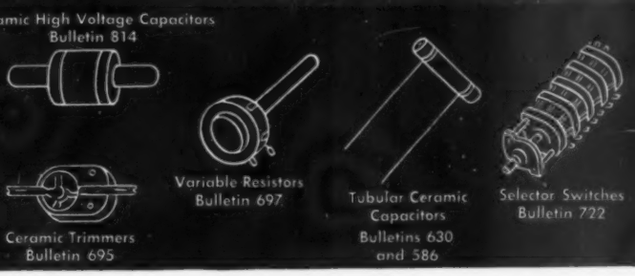
Both in original equipment and in replacements, the symbol "CRL" is the Mark of Quality.

. . . Always specify Centralab.

Ceramic High Voltage Capacitors
Bulletin 814

Centralab
CRL
Division of GLOBE-UNION INC., Milwaukee

PRODUCERS OF



Ceramic High Voltage Capacitors Bulletin 814
Variable Resistors Bulletin 697
Tubular Ceramic Capacitors Bulletins 630 and 586
Selector Switches Bulletin 722
Ceramic Trimmers Bulletin 695

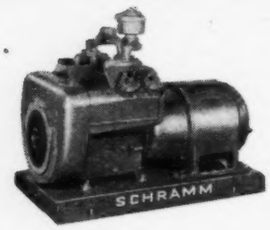
There's a

SCHRAMM

AIR COMPRESSOR

. . . for your every need!

SIZES RANGING FROM 2 TO 600 CU. FT. DISPLACEMENT

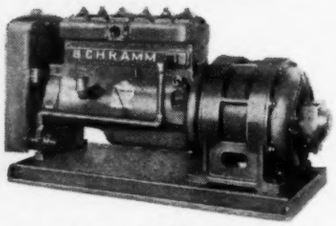


DIRECT DRIVE ON BASE

Built-in Motor Drive mounted on steel base is compact and easy to install. No foundations necessary.

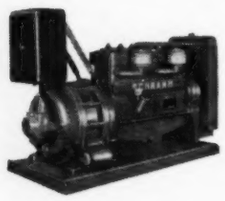
WITH "V" GROOVE PULLEY

Schramm Belt Driven Compressors can be obtained with "V" or flat belt drive suitable for twenty-four hour service and economical operation.



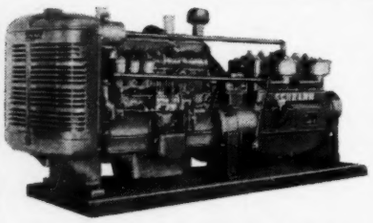
DIRECT MOTOR DRIVE WITH COOLING UNIT

Schramm 300 cu. ft. displacement with direct-connected 50 H.P. motor with cooling unit on Steel Deck Base.



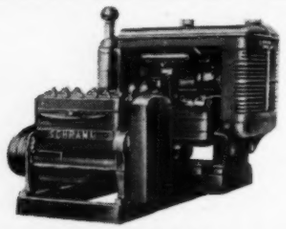
DIRECT DRIVE WITH STARTER AND RADIATOR

Both compressor and motor are mounted as a single unit on a substantial steel base with starter, radiator, and cooling unit.



DIESEL ENGINE DRIVE-IN LINE

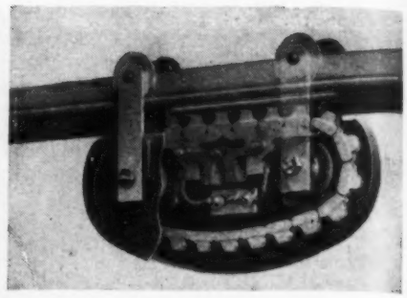
Complete self-aligned, direct connected Diesel Engine Driven Compressor for semi-portable or stationary installation.



BELT DRIVE ON BASE WITH ENGINE

Schramm Engine Belt Drive on Base combinations are available for applications not reached by electric power service in mill, mine, and other industrial plants.

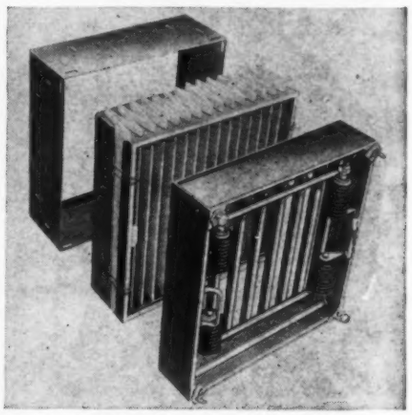
SCHRAMM INC. COMPRESSOR SPECIALISTS WEST CHESTER PENNSYLVANIA



prevent accidents and injuries caused by exposed conductors, it can be installed in old or new plants. Consists of copper conductor, in standard 10-ft. lengths, encased in slotted rubber rack supported by rigid backing, and includes individual traveling collectors which employ an endless chain, like a tractor tread, to effect positive six-tooth multiple contact at all times. Arcing and pitting, as well as fire and explosion hazards, are thereby prevented, maker says. Low wear factor of the system reduces replacements of trolley wheels and shoes. Benbow Mfg. Co., Hobart Bldg., San Francisco 4.

Electronic Air Filter

Featuring collector element of electrostatically charged Airmat paper, Electro-Airmat electronic air filter is introduced. Said to have arrestance rating (when tested by the discoloration method) of 90 percent or better, with atmospheric dust or smoke, at the normal velocity of 35 f.p.m. through



the Airmat media, and standard rating of 1000 c.f.m., standard-sized 24x24-in. unit. Airmat is a cellulose product composed of a number of plies of porous-tissue-like sheets formed of short cellulose fibers in "jack-straw" arrangement, and is replaceable. The power pack operates on a 110-volt, 60-cycle single-phase current. Total power consumption is approximately 220 watts at 110 volts, including transformer losses in power pack. American Air Filter Co., 125 Central Ave., Louisville 8.

Static Eliminator

Elimination of static electricity from machinery, as well as from moving paper, plastic sheeting, textiles, and other materials, is the function of Ionotron unit. It has no moving parts, and requires no electrical connections. Static-neutralizing element con-

You can figure out your shipping losses from damage in dollars and cents . . . but you have no way of knowing how much business you may lose when customers become disgruntled because your products arrive in poor condition.

There's no need to toss away business through unsatisfactory shipping containers—not when you can buy SUPERSTRONG boxes and crates that are "Bound with Steel." They give you added protection with added economy to banish shipping worries.

SHIPPING TRADE MARK SUPERSTRONG CONTAINERS REG. U.S. PAT. OFF.

RATHBORNE, HAIR AND RIDGWAY COMPANY

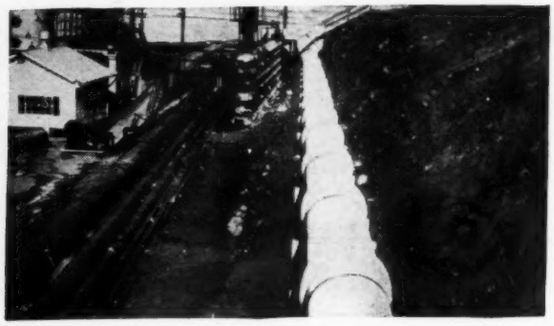
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

CUT COSTS 3 WAYS
on Industrial Water Lines

1. installation

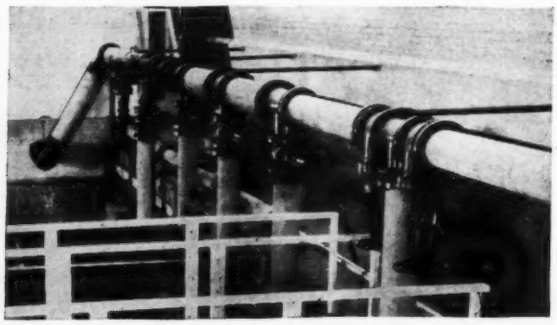
In every phase of industrial water pipe installation, you save with Transite . . . because this asbestos-cement pipe is relatively light in weight, easier to handle. Even unskilled crews can install it quickly, economically, thanks to the Simplex Coupling which speeds assembly and assures tight, flexible joints.

2. operation



Because Transite Pipe is non-metallic, its initial high flow rate (C-140) can never be reduced by tuberculation, the internal corrosion which chokes off carrying capacity. As a result, pumping costs are minimized. And Transite cannot cause "red water" or rusty scale.

3. maintenance



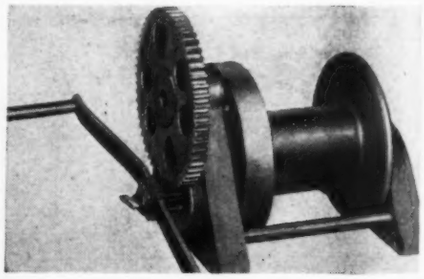
Through the years, this strong, durable pipe provides efficient, economical service, stubbornly resists corrosion *all the way through!* That's one reason why more and more plant operators are using Transite Pipe for supply lines, fire lines, water condenser lines and process lines of many types.

JOHNS-MANVILLE
TRANSITE PIPE
for Supply Lines
for Fire Lines
for Process Lines
for Water Condenser Lines

sists of thin metallic foil, incorporating a radioactive substance welded to a non-radioactive metallic backing. Alpha radiation is emitted directionally, creating an ionized zone in region of electrostatic charge. Assembly is mounted in housing designed to provide adequate shielding. No redesign of existing equipment is needed for installing, but engineering problems are involved, such as determination of alpha-radiation strength required, and proper positioning in relation to stock and machine parts. United States Radium Corp., 535 Pearl St., New York 7.

Winch

Known as Handiwinch, hand-powered winch of all-steel construction is equipped with adjustable, removable crank. Unit handles 10,000 pounds at 27:1 reduction, and 1900 pounds at 4.5:1 reduction on a single line, with 70-lb. crank load at the 20-in. adjustment. Drum can be driven either through



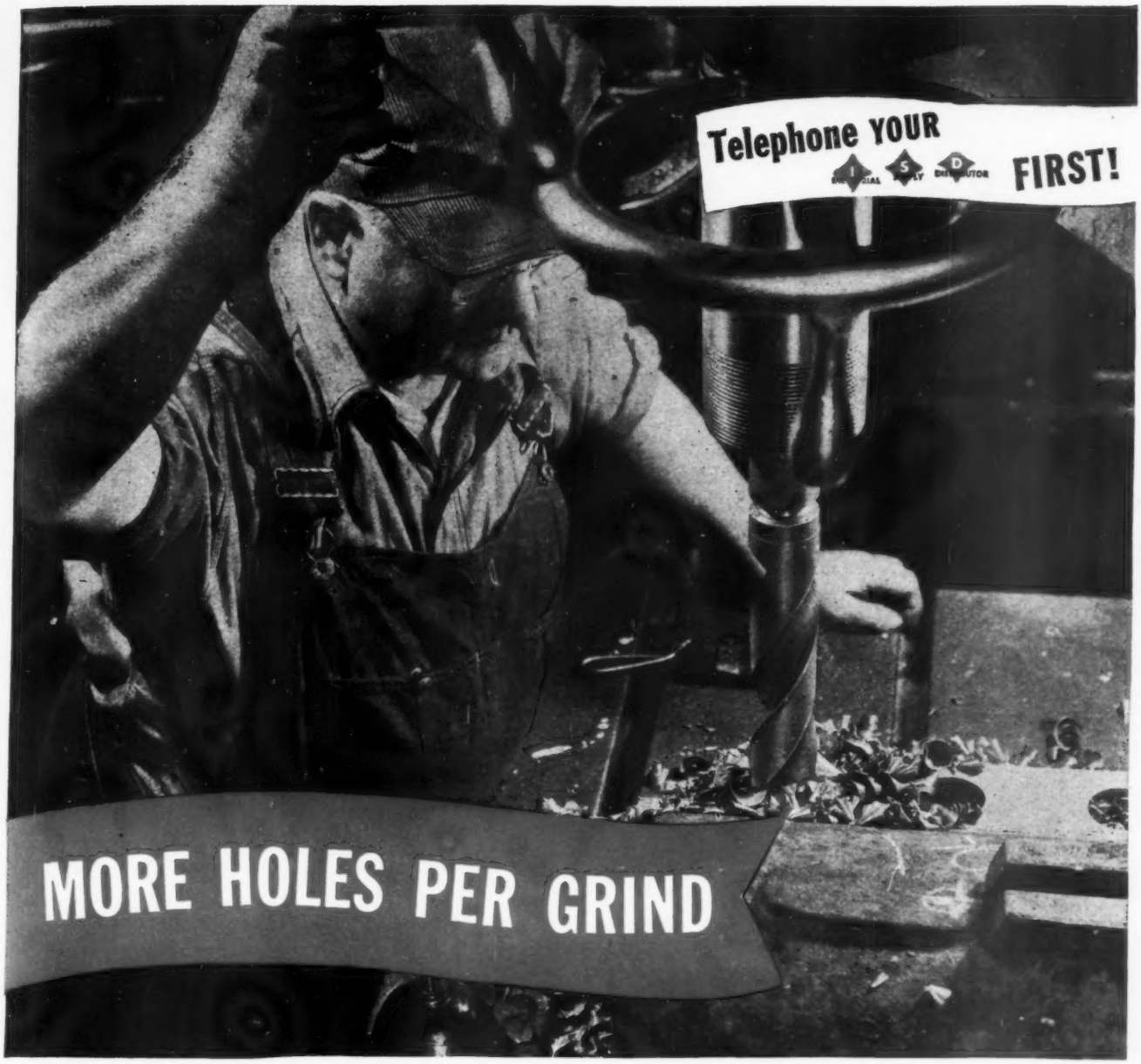
the 27:1 double reduction gears for heavy loads, or the 4.5:1 single reduction gears for light loads. Gears are held in place by simple latch. Band brake engages on drum mounted on high-speed pinion shaft having the 27:1 gear ratio to the drum, providing handling of heavy loads without creep. Ratchet forms integral part of brakedrum, which is engaged by spring-equipped pawl for holding heavy loads safely. With exception of drum, the winch is equipped with self-lubricating bushings throughout. Oil holes are provided for drum bushings. American Hoist & Derrick Co., St. Paul 1.

Fixture Business Acquired

Sale of General Electric Lamp Department's business in RF (rectified fluorescent) and Cooper Hewitt fixtures to the Electro Manufacturing Company, 2000 West Fulton St., Chicago, is announced. This transaction is in conformance with the lamp department's policy not to manufacture lighting equipment. The Electro Manufacturing Company will supply fixtures and parts, but not tubes.

Control Valve

Model CV Series "Modernair" 4-way control valve is adaptable to hand, foot, or pilot operation, by simple assembly changes of identical housings. Designed for the control of air and low pressure hydraulic systems, valve is balanced, uses aircraft type packing, and is free of metal-to-metal contact between wearing parts. Transmits full line volume and pressure, without operation of valve being affected by variation of line pressure. Operates normally "on" or "off" in three positions, with center po-



with CLE-FORGE HIGH SPEED DRILLS

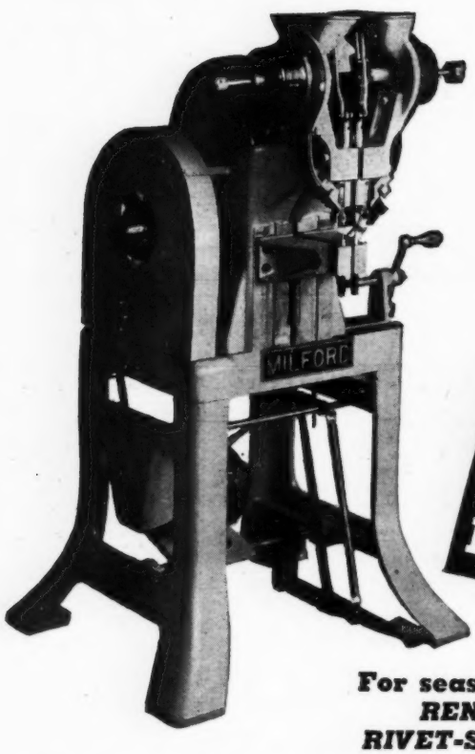
● CLE-FORGE Drills are not only the finest twist drills you can buy, but also are the most economical. Figured on the basis of *cost per hole,* they give the biggest dollar value. The same economy can be obtained with other CLEVELAND tools—Reamers, Screw Extractors, Arbors, Mandrels, Sockets, Mills and Counterbores.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49th STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

80 THOMAS ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 650 HOWARD ST. SAN FRANCISCO
4518 SECOND BLVD. DETROIT · BRUNEL ROAD, OLD OAK COMMON LANE, ACTON, LONDON W. 3, ENGLAND

Fastening Costs Too High?



CUT THEM DOWN WITH

MILFORD FASTENING EQUIPMENT

For seasonal or limited use,
RENT A MILFORD RIVET-SETTING MACHINE

Not alone cost of fasteners, but cost of fasteners AND of time in getting parts in position, determine the real costs of a fastening operation.

Such cost comparisons, on the most diverse products requiring small metal fasteners, have repeatedly proved that Milford semi-tubular rivets and rivet-setting machines (in several models) shrink costs to a remnant of what they were with other types of fasteners.

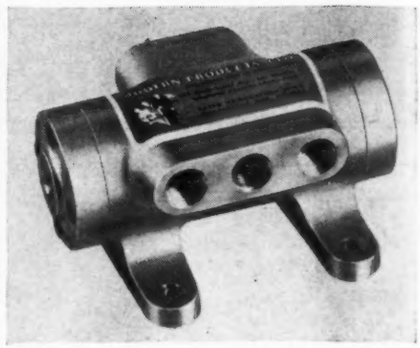
No matter how low your present fastening costs, the possibility that Milford products and service may reduce them still further—or may speed fastening operations—makes investigation worthwhile.

Without obligation, send a sample of your product for study by Milford engineers.

THE MILFORD RIVET & MACHINE CO.
MILFORD, CONN. ELYRIA, OHIO

Inquiries may also be addressed to our subsidiary:
THE PENN RIVET & MACHINE CO., PHILADELPHIA 3, PENNA.

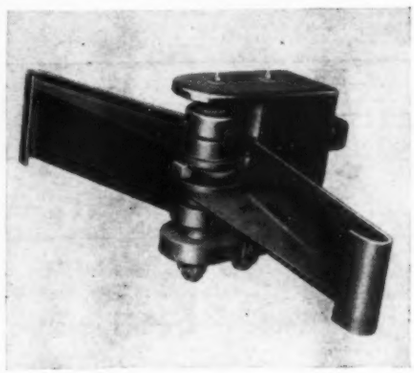
Designers and Manufacturers of: **SPECIAL COLD-HEADED PARTS; SPLIT, SEMI-TUBULAR AND DEEP-DRILLED RIVETS; RIVET-SETTING MACHINES; SPECIAL MACHINE SCREWS AND SCREW MACHINE PARTS.**



sition "neutral." In neutral position, when valve is used for cylinder control, unit may be arranged to permit positioning of piston with pressure balanced on both sides of piston, or with pressure relieved at both piston ends. Can be used as single 3-way valve by plugging one outlet port, or as two 3-way valves in series. When installed as two 3-way valves in series, one valve has the pressure on, while the other has pressure off. Modern Products Ltd., 952 South Grand Ave., Los Angeles 15.

Automatic Traffic Control

Installed where two conveyor lines converge into one, automatic mechanism is designed to control the flow of packages and prevent interruption caused by jamming. Arms of the self-contained unit are adjusted to alternate groups of packages from the two con-



veyor lines moving forward into the single line. When two or more branch conveyor lines converge into one main line, coordination of package flow is obtained by placing control unit at each conveyor junction. This makes possible the simultaneous operation of all branch lines feeding into main line. The arms are supplied in several models, type to be used depending on width of conveyor and package characteristics. Alvey Conveyor Mfg. Co., Broadway, Wyoming & 7th Sts., St. Louis.

Cable, Pipe Locator-Tester

Combining factors for checking location and depth of buried pipe and cable, Stewart combined cable tester and locator is introduced. Unit also finds shorts, crosses, grounds, and wet spots, and has lamp circuit for checking all connections after test has been set up. Can check depth of cable at river crossings, and determine whether or

...military operations ... throttling south along the main railway line.

...ment troops driving within 50 miles of Mukden, vital rail center in the battle for Manchuria.

...library, auditorium, music room, gymnasium ... door swimming pool. One complete wing will be devoted to hospital facilities.

...previously acknowledged that the separatist ... were operating in Khamseh, armed with weapons which were distributed by unknown people.

New Trigger Grip Speeds Attack on Plant Fires

Requiring only the pressure of a single finger to operate it, the trigger-control valve now supplied on all 10-, 15- and 20-pound sizes of Kidde Portable Extinguishers speeds the attack on fire by providing faster starting of the carbon dioxide discharge.

The natural way to operate extinguishers with this new valve is the right way: merely aim at the fire and pull the trigger. The valve can be easily locked in the open position, if desired, simply by a slight forward movement of the trigger. As all the working parts are fully enclosed, there is no danger of the valve's becoming fouled.

Full information on the trigger control valve may be obtained from Walter Kidde & Company, Inc.

Free

"Show-'em-How" Book on Fire Fighting

Demonstrate to your employees just what to do in case of fire. Free booklet tells you how. Write for copy.

Walter Kidde & Company, Inc., 132 Main Street, Belleville 9, N. J.

Kidde

SAFE . . . SIMPLE . . .
FAST-STARTING . . .
FOOLPROOF

15 pounds of carbon dioxide.
Single-finger control.
Simple lock-open operation.
Working parts enclosed — cannot foul.

Mail and Phone Orders Filled

Kidde

NEVER-NAPPING WATCHMAN

Works on rate of temperature rise. Sounds alarm, and operates extinguishing system automatically. Supplied as part of complete Kidde built-in systems. Other types of detection for automatic operation also available.

Kidde

Bargain in Fire Fighting!

Gets to fires fast—and hits them hard. Combines the wallop of a built-in system with the flexibility of application of a hand portable. Model 50 (illustrated) has 50-pound carbon dioxide capacity. Also in 75-pound and 100-pound sizes.

MAIL AND PHONE ORDERS FILLED

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc. • 132 Main Street, Belleville 9, New Jersey

Industrial Output

WASHINGTON ... —The ... General output at factories and mines decreased 4 per cent in October, while in the first half of November ... basic industrials ...

British Brides Fall

... stationed in a little town in France for several months, wooed a French girl by telling her about ... the ... into ...

When it's Too HOT...Too HEAVY..

Too SLOW by Hand

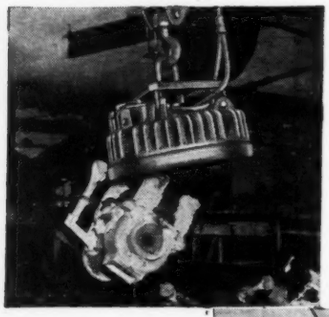
an EC&M Magnet

gives a LIFT wherever needed

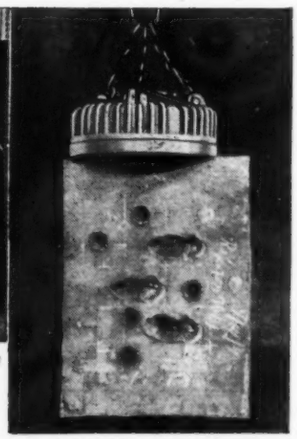
10 CIRCULAR SIZES • A MAGNET FOR *EVERY* CRANE

29-inch diameter Magnet receives 36-volt power directly from crane-truck.

Handling hot casting as soon as edges cool to become magnetic.



25-inch Magnet lifts heavy die-blanks on and off surface grinder.

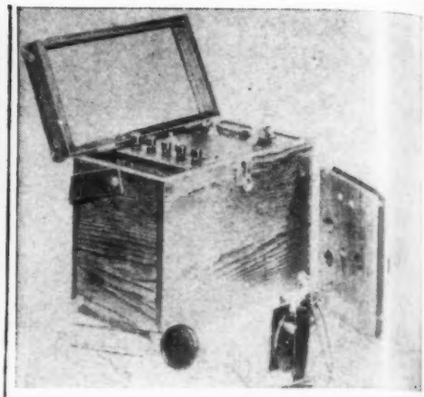


29R size lifts 1200-lb. pierced armour plate on edge.

THESE are small magnets of 29-inch diameter and less, which are designed to do the odd jobs throughout industry. They handle hot castings from the shake-out floor and lift heavy material from floor to machine. Because of their low cost and medium weight, they can be effectively used on industrial crane-trucks to reach into corners, between machines, through narrow aisles—to cover the territory inaccessible to overhead cranes. New Bulletin 904 describes and illustrates these magnets at work. Write for your copy.

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79th STREET • CLEVELAND 4, OHIO



not a service pipe is below the frost line. It is furnished with detector coil and neutral exploring coil. Built-in level in coil enables operator to maintain accuracy. Unit is ruggedly built, portable, and encased for rough use and weather. Includes head phones and neutral exploring coil, as well as fish-scale exploring coil. W. C. Dillon & Co., Inc., 5410 West Harrison St., Chicago 44.

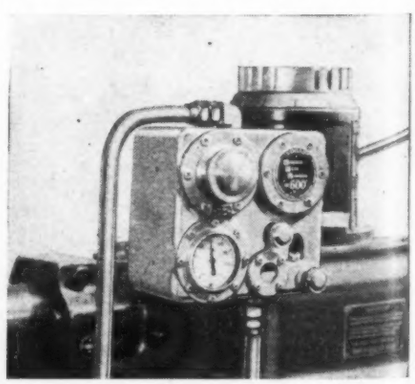
New Companies

Brooks Rotameter Company, Lansdale, Pa., has been organized to make rotameters for flow rate measurement and control.

Incorporation papers have been filed for the Cincinnati Lathe & Tool Company, which has acquired the business and assets of the recently discontinued Cincinnati Lathe & Tool Company, Oakley, Ohio. The new company is a subsidiary of The Cincinnati Milling Machine Company, but will be operated independently. Manufacture of "Cintilathes" will be continued by the new management.

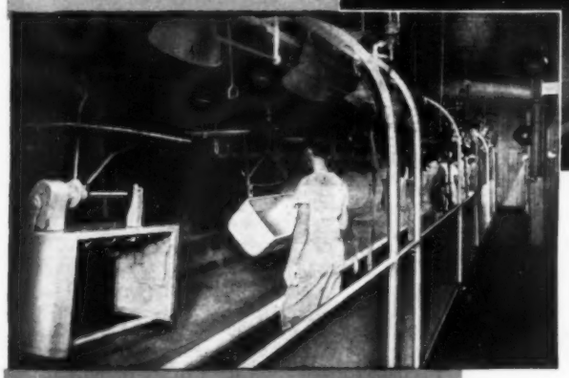
Combination Air Unit

The R-F-L unit incorporates reducing valve, pressure gage, filter, and lubricating mechanism in a compact casting measuring 6 inches square by 4¾ inches deep. All connections are built into the casting, eliminating piping and resultant friction. Components are controlled from, or visible on, front panel. Unit is mounted in the air intake line from main air line, and is adapted to location on central control panel. Can be used with old or new air equipment, incorporated in air devices, and applied in manufacturing as well as processing plants. It levels out surges and sudden



COMPLETE *Finishing* SYSTEMS

The famous Nineteen Hundred Washer receiving its first finish coat in Mahon Hydro-Filter Spray Booths.



Nineteen Hundred Washers moving through Mahon Hydro-Filter Spray Booths on the continuous conveyor production line.

Final Finish Coat is applied as products pass through Mahon Hydro-Filter Spray Booths installed in an enclosed Spray Room which is supplied with Heated Filtered Air.

. . . COMPLETE EQUIPMENT . . . from Preparation of Metal to Final Finish Coat

At the Plant of the Nineteen Hundred Corporation, Mahon equipment is relied upon exclusively to produce the fine finish of the Nineteen Hundred Line. In plants of this type, where mass production and efficient methods must be aimed at eye-appeal and saleability of finished products, executives turn to Mahon . . . Why? . . . because over twenty-five years of experience has endowed the Mahon organization with a wealth of technical knowledge in this field not available elsewhere . . . because Mahon engineers, builds, and installs the Complete Finishing System—complete responsibility lies with one organization. What Mahon engineers have done for the Nineteen Hundred Corporation, and hundreds of other manufacturers, can also be done for you. Consultation places you under no obligation.

Address Correspondence to INDUSTRIAL EQUIPMENT DIVISION

THE R. C. MAHON COMPANY

Home Office and Plant, Detroit 11, Michigan
Western Sales Division, Chicago 4, Illinois

Manufacturers of Complete Finishing Systems including: Metal Cleaning Machines • Rust Proofing Machines • Dry-off Ovens • Hydro-Filter Spray Booths • Drying and Baking Ovens • Filtered Air Supply Units • Hydro-Foam Dust Collectors • Paint Sludge Reclaiming Units, and Many Other Units of Special Production Equipment

MAHON

NEW LIQUID ARMOR

Seals Out CORROSION

Neolux

—the MIRACLE PROTECTIVE COATING

PROTECTS STRUCTURAL STEEL WALLS, ELEVATORS, TANKS MACHINERY, BRIDGES FENCES, CONCRETE, BRICK STONE, ETC.

NOW...A TOUGHER, LONGER-LASTING LOW-COST PROTECTIVE COATING

- NO PRIMER NEEDED . . . 2 COATS AN[illegible]LE
- EXTREMELY LOW PERMEABILITY
- WILL NOT "SKIN" IN CAN . . . NO WASTE
- RESISTS HEAT UP TO 265°F

Neolux is an entirely new type of protective coating. Made from a blend of chemically inert thermoplastic and thermosetting synthetic resins, it forms a tough, durable, long lasting, protective film of pure plastic, impervious to fumes, corrosion and weather.

Neolux will not oxidize — will not craze or check — puts up an air-tight defense against corrosion.. Neolux brushes on easily, dries quickly . . . even over most painted surfaces. And the most severe tests forecast longer life than any known oil-base paint. Now it's ready to cut your maintenance costs. Available in black, gray, green, clear and ready-mixed aluminum.

Introductory Trial Offer

1 quart of black, gray, clear or aluminum plus 1 pint of Neolux thinner $2.80 prepaid anywhere in U. S. A.

CHAMBERLAIN ENGINEERING CORPORATION

5000 BRIMFIELD RD., AKRON 9, O.

drops in air supply, keeping working pressure uniform with minimum air consumption. Filter and lubricator assist air equipment to operate at peak capacity, and effect an increase in service life. Logansport Machine Co., Inc., Logansport, Ind.

Fuel Oil Pump

Bunker "C" fuel oil and liquids of similar characteristics are handled by rotary pumping unit now on the market. Bronze-fitted, it operates on the bucket design or swinging vane principle. Because of this construction, pump is self-adjusting for wear, preventing loss of capacity during life of buckets, which, when worn, may be replaced by removing head of pump. No adjustments or wearing-in are necessary. Power unit is gearhead motor of 50 horsepower, with speed of 150 r.p.m. at drive shaft connected to pump by flexible coupling. Pump has 500-g.p.m. capacity, and operates at 125-p.s.i. pressure. Blackmer Pump Co., Grand Rapids, Mich.

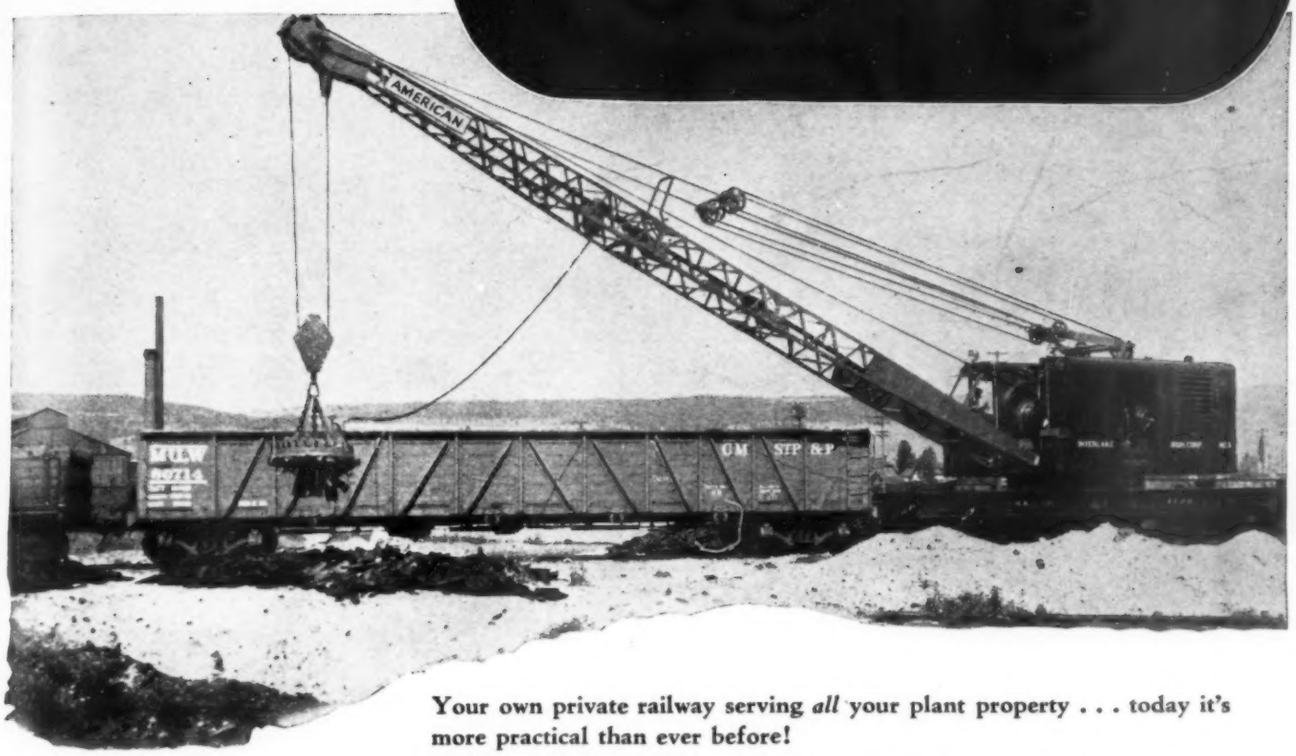
Silicone Greases

To supply high and low temperature lubrication, four silicone greases have been developed. Manufacturer claims they are characterized by a high order of heat stability, low volatility, relatively slight changes in consistency over a wide temperature range, and low freezing points. Two of the greases, DC 31 and DC 41, are compounded of almost entirely inorganic materials. They are corona resistant, and are semi-conducting because of carbon black content. The other two greases, DC 33 and DC 44, are light brown in color, compounded with metallic soaps selected for heat stability. Of the four greases, DC 31 and DC 33 are for low temperature lubrication, but also operate at elevated temperatures. DC 41 and DC 44 are designed for high temperature lubrication. Dow Corning Corp., P. O. Box 592, Midland, Mich.

Crane

Model MC-8 Roustabout crane is a mobile full-swing boom crane, tractor mounted, handling loads up to 10 tons. Booms of standard lengths from 15 to 30 feet are furnished. Crane is adapted to use of long booms, and handles loads up to 2 tons at 30-ft. radius, and 10 tons at 9 feet. Ball-bearing boom turntable and all gears and clutches run in oil, fully enclosed. Boom

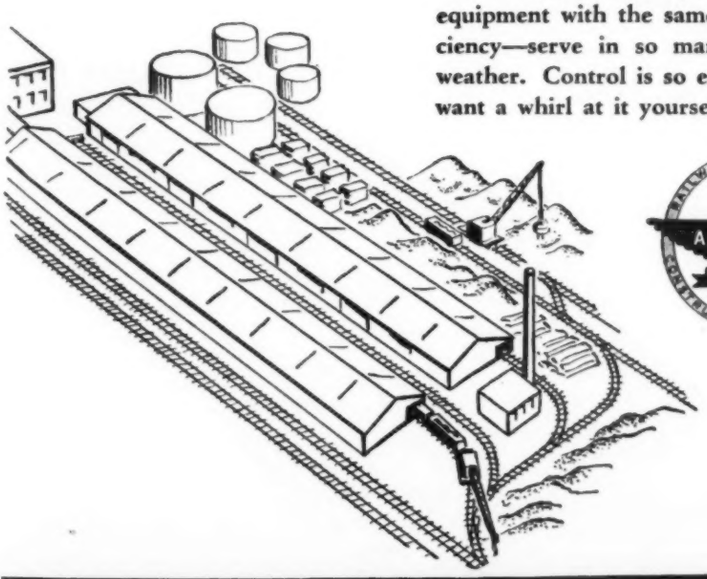
Private Railways, Unltd.



Your own private railway serving *all* your plant property . . . today it's more practical than ever before!

Rail-served storage and stockpiling facilities are now the lowest cost available for many industrial and power plants, small as well as large. Reason: the new "American" Diesel-Electric Locomotive Crane.

You don't need a large volume of work to make a small capacity Diesel-Electric profitable, and a large capacity will handle huge tonnages. It will out-switch ordinary switch engines. And no other loading-unloading equipment with the same capacity will approach its flexibility and efficiency—serve in so many ways over such large areas regardless of weather. Control is so easy workmen enjoy using this new tool—you'll want a whirl at it yourself. Write for Catalog 600.



AMERICAN

American

HOIST & DERRICK CO.

St. Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

We Created and Designed It, Not by Magic but by

engineering brains & experience

Rubber parts are just coming into their own and many a manufacturer confronted with a mechanical problem has found the solution in rubber parts created by Johnson engineers. That's a job our engineers are constantly doing and one they are well qualified to handle.

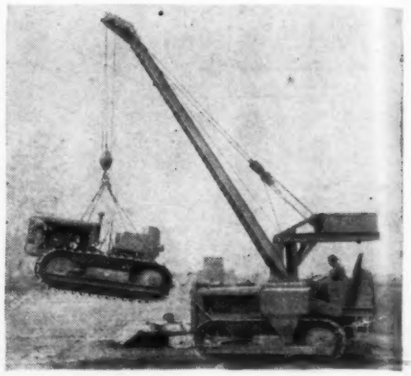
Years of experience has taught them how, when and where to put rubber parts to work advantageously. Experiments have proven over a period of years that in many instances rubber parts will outlast metal parts and operate more efficiently.

The solution to one of your product problems may be found in a newly designed rubber part. If "skill to do comes of doing" this explains the popularity of this fifty year old company in producing rubber parts for industry.

If you have a problem our engineers will be more than glad to work with your engineers, feel free to call on them at any time.

THE JOHNSON RUBBER CO.

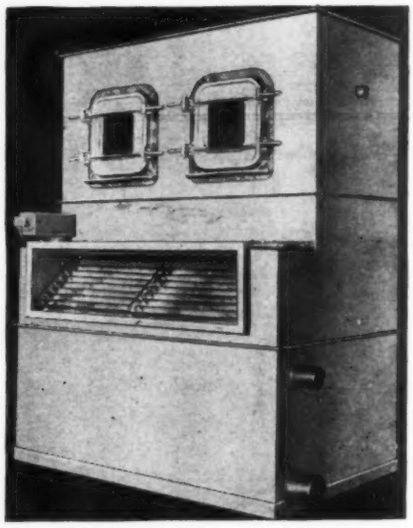
Middlefield, Ohio U.S.A.



swing and hoist and load hoist are independent actions, with separate controls and automatic brakes. Unit is suitable for loading, unloading, moving, or stacking heavy, bulky objects outside the range of large overhead cranes, or where none are available. The Hughes-Keenan Co., 649 Newman St., Mansfield, Ohio.

Air Conditioning Equipment

Vertical contactor of heavy-duty construction is offered in the Kathabar unit, for large industrial application where close control of humidity is necessary to maintain product



quality, and to insure continuous production. System provides a means of dehumidifying-humidifying the air in quantities from 10,000 to 70,000 c.f.m., independently of temperature, for processing operations, and for personal comfort. Smaller package units from 1350 to 5000 c.f.m. and large central systems also are available. Some of the processing operations provide conditioned air as low as 19 degrees dew point, or about 6 percent relative humidity at 90 deg. F. Units utilize an inherently continuous regenerative process, thereby eliminating cyclic operation, and providing constant 365-day operation. Kathabar Div., Surface Combustion Corp., Toledo 1.

Transparent Rustproofing

Rustproofing coat, called Clear Coat, dries to a hard transparent film. Can be employed on angle bars, bits, drills, castings, ma-

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

YOU WILL NOW FIND THIS MARK ETCHED ON ALL THESE FINE PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

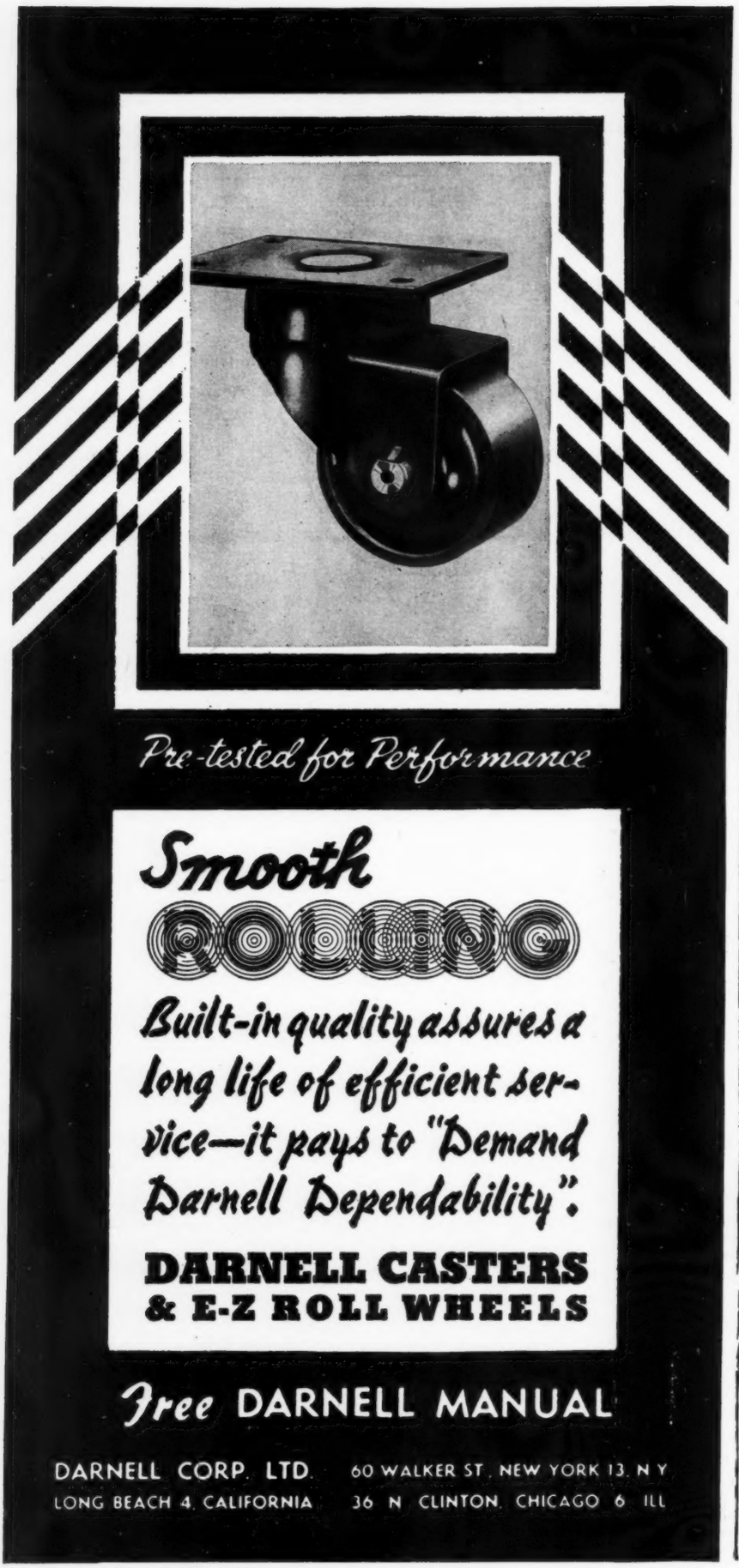
From now on, all Simonds Saws for cutting wood, metal, and plastics... all Simonds Machine Knives for cutting wood, veneer, and paper... all Simonds Red Tang Files... all Simonds steel and steel specialties... *every one* of these first-quality products will bear the same mark of family-identity you see above. And a like mark will also identify the products of Simonds Abrasive Company of Philadelphia (formerly the Abrasive Company), of Simonds Canada Saw Company, and of Simonds Steel Mills at Lockport, New York.

So now, when you want fine tools for cutting and grinding, this ribbon-etch... signature of America's longest experienced firm of sawmakers... tells you at a glance: "There's no finer tool made in this line... *anywhere.*"

SIMONDS rhymes with diamonds

...and Simonds Tools cut with diamond-like smoothness and precision. Order from your Industrial Supply Distributor or dealer, or write the nearest Simonds office:

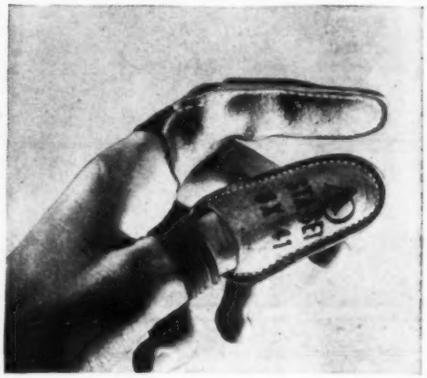
BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Washington.
Canadian Factory: 595 St. Remi St., Montreal 30, Que.


Pre-tested for Performance
Smooth
ROLLING
Built-in quality assures a long life of efficient service—it pays to "Demand Darnell Dependability".
DARNELL CASTERS & E-Z ROLL WHEELS
Free DARNELL MANUAL
DARNELL CORP. LTD. LONG BEACH 4, CALIFORNIA
60 WALKER ST., NEW YORK 13, N.Y.
36 N. CLINTON, CHICAGO 6, ILL.

chined surfaces, pipe and pipe-fittings, wire, sheet steel, and similar products. Numbered markings on metal show clearly through the coating. Available in light, medium, and heavy grades, all of which are said to have high adhesion to metal, and to show no cracking or peeling in any temperature, even if metal is bent after application. The heavy grade is for metals used out of doors, and the light grade is suitable as a coating under paint. Nox-Rust Chemical Corp., 2459 South Halsted St., Chicago 8.

Finger Guards

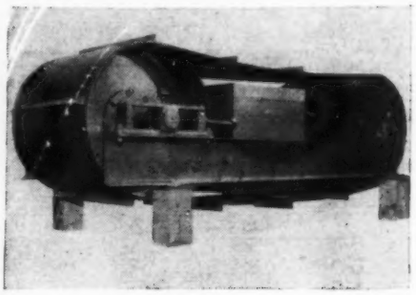
Two types of finger cots are available in small, medium (standard), and large sizes. One of the Sta-Set cots, made from grain leather, is suitable where sensitivity of touch is a factor, such as soldering small wire, and



assembly work. The second is made from chrome tanned cowhide leather, and can be used for jobs involving hard usage, such as polishing, burring, and grinding small parts. Both types provide protection for both front and back of fingers, and stay in place. Soft pliable leather is used, with an elastic strap in back at bottom of guard, permitting freedom of movement. American Optical Co., Southbridge, Mass.

Electro-Magnet

Self-cleaning rectangular electro-magnet is for use where a large amount of miscellaneous iron is to be separated. Unit is made automatic in operation with aid of cross-belt that conveys tramp iron to a dis-



card pile. Non-magnetic angles riveted to cross-belt plus a fast belt speed effect quick removal of tramp iron from magnet face so that oncoming iron cannot pile up and clog the area. Separator principle prevents iron from forming over the magnet in a layer that might drag material being passed on lower conveyor belt. Magnet can be applied where magnetic head pulleys can-

I. B. EQUIPMENT

FOR BIG MATERIAL HANDLING JOBS!

When the material handling job looms big and bulky, you can depend on Industrial Brownhoist equipment to do it quicker, easier, and with less time out for maintenance and repair. I.B. locomotive cranes, coal and ore bridges, car dumpers, portal pier and tower cranes are all built for fast, low cost, long life operation. It's a fact—Industrial Brownhoist has the engineered answer to the biggest, most complicated material handling problems.

INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

INDUSTRIAL BROWNHOIST CORP. • BAY CITY, MICH. • District Offices: New York, Philadelphia, Cleveland, Chicago • Agencies: Detroit, Birmingham, Houston, Denver, Los Angeles, San Francisco, Seattle, Vancouver, B.C., Winnipeg, Canadian Brownhoist Ltd., Montreal, Quebec.

Above: I.B. Locomotive Crane with patented Monitor-type cab which permits 360° visibility.

Right: I.B. 4-5 Ton Coal Bridge with 300 ft. span.

From the receiving platform through processing, assembly and finally through shipping of finished product, Logan straight-line-flow conveyor methods are speeding operations for manufacturers throughout the nation. At every major moving point permanent time-and-effort savings are possible. We would welcome an opportunity to discuss your materials handling problems with you. Send today for catalog and engineering data on the Logan Conveyor line.

Logan Co., Inc., 510 Cabel St., Louisville 6, Kentucky

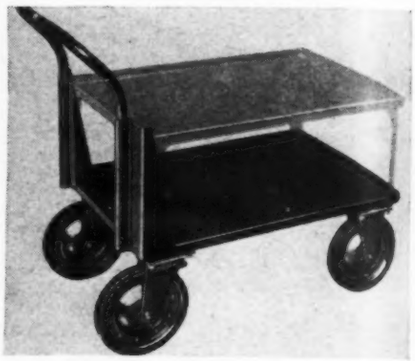
Logan Conveyors

PUT *FLOW* INTO PRODUCTION

not be installed, or where excessive main conveyor belt speeds are present. Available in widths comparable to conveyor belt over which it is suspended, and in both standard and heavy-duty intensities. Dings Magnetic Separator Co., Milwaukee 7.

Utility Truck

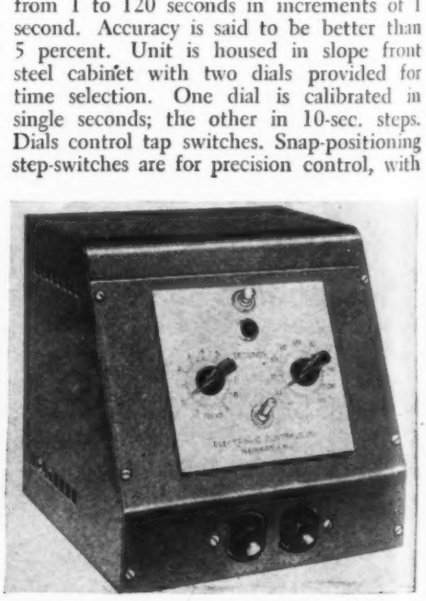
Flexibility is featured in patented all-purpose utility truck designed for handling parts, equipment, and supplies. Incorporates short wheelbase, for maneuverability, and all-steel construction. Smaller than the heavier trucks and wagons used for extra-heavy loads, the



unit handles the odd transport jobs around plant. Steel bed and platform of truck are seamless one-piece construction. All corners are rounded and edges reinforced. Corner guards give handle maximum rigidity and protect corners of load. Reinforced steel channel runs beneath bed of truck. Manufacturer claims that 75- to 100-lb. weights can be dropped on bed of truck without impairing its life or durability. Platform is removable, and each truck can carry from one to four platforms. Steel disk wheels are ball bearing, and can be supplied with either rubber or plastic tires. Drinkwater, Inc., 2323 South Michigan Ave., Chicago 16.

Electronic Interval Timer

Suitable for applications requiring accurate circuit timing, electronic timer has range from 1 to 120 seconds in increments of 1 second. Accuracy is said to be better than 5 percent. Unit is housed in slope front steel cabinet with two dials provided for time selection. One dial is calibrated in single seconds; the other in 10-sec. steps. Dials control tap switches. Snap-positioning step-switches are for precision control, with



Case history No. 204

The job was a tough one on files which were used to remove sharp edges from a bomber gun-port ring as it was spun in a bench lathe. Ordinary files quickly showed extreme wear.

On one of his calls, a Nicholson service engineer quickly solved the problem, both as to finishing results and from the standpoint of file-replacement costs.

A 10" Nicholson file for Stainless Steel,* in the Bastard cut, was tested on the job. It cut extremely well, and showed only a fraction of the wear of the files previously used.

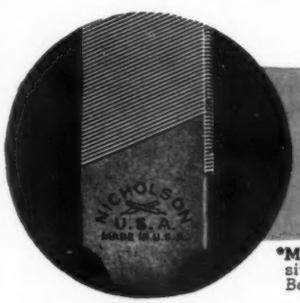
In their travels up and down the vast fields of industry, Nicholson service engineers are constantly running across instances where the advantages of using *The right file for the job* are clearly apparent in better work, faster production, or lower file costs. But they also find many instances where the *wrong* file for the job is incurring excessive costs—especially on mass-production work.

Nicholson has always gone beyond just making good files. Here the study of industry's filing problems is a never-ending one. New metals, new products, new production methods are constantly being put under the light of filing research and experiment. *There's a reason* for the existence of every one of the more than 3000 kinds, cuts and sizes of files available in Nicholson brands.

•

***"FILE FILOSOPHY,"* the 48-page illustrated Nicholson book on kinds, use and care of files, is yours for the asking—in limited quantities for distribution among your key production men.**

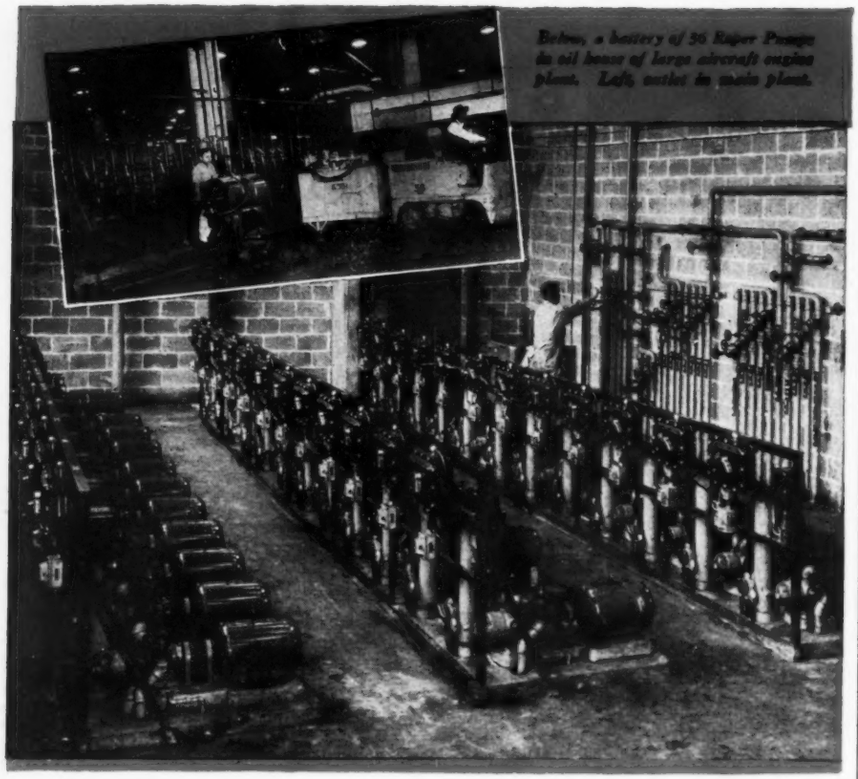
NICHOLSON FILE CO. • 27 ACORN STREET, PROVIDENCE 1, RHODE ISLAND
(In Canada, Port Hope, Ont.)



NICHOLSON U.S.A. MADE IN U.S.A.

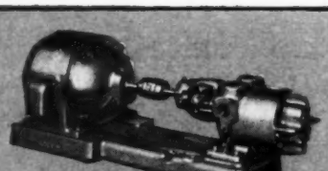
NICHOLSON FILES
FOR EVERY PURPOSE

***Mill Bastard for Stainless Steel**—specially designed to resist abrasive action of hard chromium and nickel content of stainless steel. Be sure your orders for these files specify "for Stainless Steel."*



Below, a battery of 36 Roper Pumps in oil house of large aircraft engine plant. Left, outlet in main plant.

HOW A MODERN INDUSTRIAL PLANT SAVES TIME AND LABOR *with* ROPER PUMPS



JOB FACTS

Thirty-six Roper Fig. 26-F-20 rotary pumps, each individually powered by a 3 H.P. motor, are used in the oil house. Automatic pressure switches maintain a pressure of 40 lbs. in the lines. These pumps have a rated capacity of 20 g.p.m. Each Roper Pump is equipped with deep packing box, equal sized spiral gears, a flexible slider coupling drive, and flanged bronze bearings which support gears at both ends. Internal parts can be inspected or replaced quickly and easily without disturbing piping or mounting.

The big bank of Roper Pumps, shown above, are located in the oil house to speed handling of cutting oils, solvents, coolants, hydraulic and hot engine oils, and other liquids. From storage tanks direct to outlet stations, through overhead and underground pipes, they quickly dispatch the various liquids to test rooms and machining and assembly floors where convenient filling station outlets are situated. The nearest station is 1500 feet and the farthest is 5500 feet from the oil house. *Thus Roper Pumps help to save time and manpower* by eliminating inter-plant delays and inconveniences that would otherwise be associated with transporting large volumes of oils, solvents, etc.

SEND FOR CATALOG

Illustrating and describing Roper Pumps built to handle pressures up to 1000 lbs. p.s.i., capacities ¾ to 300 g.p.m. at speeds up to 1800 r.p.m.

GEO. D. ROPER CORP.

181 Blackhawk Park Avenue, Rockford, Illinois

PUMPS ESPECIALLY ENGINEERED TO FIT YOUR REQUIREMENTS

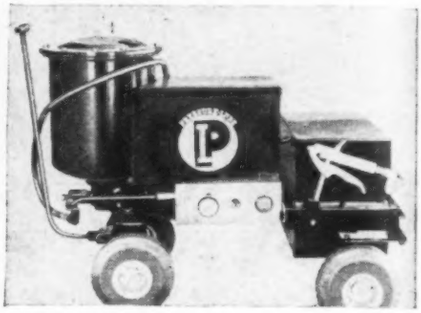
ROPER *Rotary Pumps*

BUILDERS OF PUMPS FOR MANUFACTURING, MARINE, PETROLEUM, AND PROCESS INDUSTRIES

exact values of resistance inserted in circuit at each position. Pilot light, toggle on-off switch, and push-switch are included. Double receptacle permits timing two circuits simultaneously. Contacts are normally wired SPDT with double break and are rated at 25 amps. 32 volts d.c., 25 amps. 125 volts a.c., and 10 amps. 230 volts a.c. Contacts can be wired DPDT at correspondingly lower rating. Tube used is a 2050 thyratron. Electronic Controls, Inc., 44 Summer Ave., Newark 4, N. J.

Portable Greasing Unit

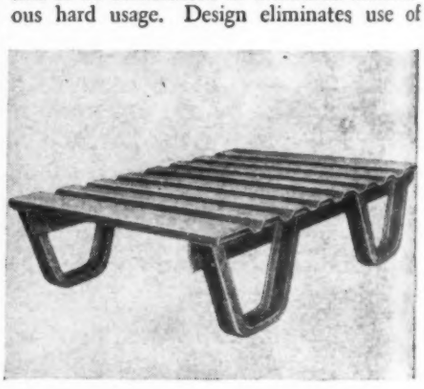
Eliminating need for hand greasing operations, portable lubricating equipment is available with either battery-powered or gasoline-driven motor. Can be supplied with grease guns for different purposes. No elec-



tric cord or air hose required. Unit delivers up to 12,000 pounds consistent pressure. Provides lubrication for trucks, tractors, and other rolling stock, on the job, without removing load. Minimum of moving parts reduces maintenance. Pressurelube, Inc., 609 West 134th St., New York 31.

Skid Platforms, Pallets, Nesting Rings

Line of skid platforms, deck pallets, and nesting rings, made in all sizes, for use with lift trucks, is announced. The equipment is said to be constructed to withstand continuous hard usage. Design eliminates use of



nails, bolts, and screws that might tear or score loads. The materials-handling line includes (1) Phil-Skid platforms, with corrugated deck of all-steel electric welded construction, with 3-in. channel large radii legs; (2) wood deck platforms built with a 1⅝-in. oak deck, also of welded construction; (3) double corrugated steel deck Phil-Pallets, for use with fork trucks; (4) lightweight corrugated deck pallets with pipe understructure, and which can be lifted from any of four sides; (5) junior Phil-Skids, simi-

Can't Knock Out Permanently Insulated ROCKBESTOS A.V.C.

You may not be looking for trouble . . . but it's on its way if you are still operating overworked circuits that were nearing collapse before the war . . . and if you still have war-installed control, power and lighting wiring in hot spots that wasn't built to take the beating of high ambient temperatures and conductor-heating overloads.

Why take chances if that's your situation? Check up on the trouble-spots and plan to eliminate future production tie-ups, shut downs, and expensive emergency maintenance by re-wiring with Rockbestos A.V.C. Power Cable, Motor Lead Cable, Control Cable and Boiler Room Wire. Their *impregnated asbestos* insulation and heavy *asbestos* braid takes operating temperatures up to 230° F., the heat of overloads, and vibration because it retains flexibility and won't bake brittle or crack. It won't bloom or rot when exposed to oil, grease or corrosive fumes . . . it won't burn because asbestos is fireproof . . . and it can be installed in conduit because specially compounded impregnants give it high moisture resistance.

Don't delay necessary wire-failure prevention . . . investigate your needs for the Rockbestos-designed National Electrical Code types illustrated and others in our line of 125 different standard wires, cables and cords. Write or phone for recommendations to the nearest district office or:

ROCKBESTOS PRODUCTS CORPORATION
116 Nicoll St., New Haven 4, Conn.

125 different wires, cables and cords developed for severe operating conditions by Rockbestos.

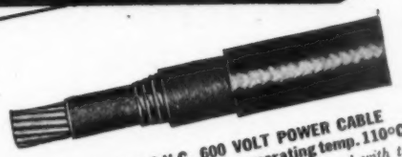
ROCKBESTOS A.V.C.

The Wire with Permanent Insulation

NEW YORK BUFFALO CLEVELAND CHICAGO PITTSBURGH ST. LOUIS
LOS ANGELES SAN FRANCISCO SEATTLE PORTLAND, ORE.

INVEST IN U. S. VICTORY BONDS

FOR POWER CIRCUITS



ROCKBESTOS A.V.C. 600 VOLT POWER CABLE (Nat. Elec. Code, Type AVA—max. operating temp. 110°C.)

Sizes No. 18 AWG to 1,000,000 CM insulated with two walls of impregnated felted asbestos, varnished cambric and asbestos braid. Other constructions for service voltages to 5000.

You can use Rockbestos A.V.C. Power Cable for hot-spot wiring, in conduit or open, around boiler rooms, steam lines, furnaces, etc., and for power leads or heat-exposed electrical equipment as it withstands high temperatures and has ample moisture resistance. Use similarly insulated Rockbestos A.V.C. Motor Lead Cable for motor leads and coil connections.

FOR LIGHTING CIRCUITS

ROCKBESTOS A.V.C. 600 VOLT BOILER ROOM WIRE (Nat. Elec. Code, Type AVA—max. operating temp. 110°C.)

Sizes No. 18 to 8 AWG insulated with varnished cambric, impregnated felted asbestos and asbestos braid. Sizes 6 to 4/0 have another wall of impregnated asbestos next to the conductor.

For lighting and control circuits exposed to heat and moisture, oil, grease, corrosive fumes or fire hazard, such as exist around furnaces, ovens, lehrs, soaking pits, boilers, etc., this widely used A.V.C. construction is ideal. Its permanent insulation will not bake brittle, crack, rot, flow or swell.

FOR CONTROL CIRCUITS

ROCKBESTOS A.V.C. 600 VOLT CONTROL CABLE

In one to 19 conductors with individuals insulated like Power Cable, cotton braid covered, and cabled with an asbestos braid overall. Standard strandings AWG No. 12—19/#25 and No. 9—19/#22. Other strandings on order.

Designed for use in equipment requiring a multi-conductor control cable capable of withstanding high temperatures, this cable is widely used in the control systems of electric cranes and other equipment used in steel mills. The insulation is unaffected by heat, corrosive fumes, oil or grease and has ample moisture resistance.

ANOTHER NEW ROCKBESTOS HIGH TEMPERATURE CONSTRUCTION!

War-developed Rockbestos High-Temperature Wire — *with a maximum operating temperature of 400° F.* — designed for jet propelled plane applications and circuits to hot-wing de-icers, fire detectors and extinguishers, and air conditioning and heating units where baking temperatures destroy ordinary insulation. Under continuous operation at rated temperature it retains its original dielectric strength and inherent resistance to heat and flame, and *progressively improves* in its resistance to moisture and abrasion. It is now available for these and other severe applications. Write for complete information and samples.

THE REFLECTOR IS THE BACKBONE OF ANY LIGHTING SYSTEM . . .

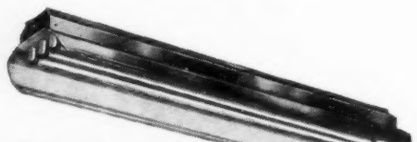
Does Your Plant Promote

Visual Skill?

There's a kind of skill that many manufacturing plants encourage to the highest degree and thereby increase production and profits. This is *visual skill* – the ability of the worker to "see faster", to set up his work, use his tools, read calibrations and make inspections more quickly and efficiently. There's one sure way to promote this – by the use of *Skilled Lighting!*

Wheeler has specialized in the study of visual skills and in designing and producing lighting equipment to meet all requirements – equipment that extracts maximum illumination from standard lamps. Wheeler's line of reflectors is made for long, efficient service – high grade, heavy duty materials with enduring vitreous enameling.

Learn how you can profit by increasing visual skills throughout your plant with Skilled Lighting. Write for Catalogs. **Wheeler Reflector Company, 275 Congress St., Boston 10, Mass.** Representatives in principal cities.



All-Steel Open-End Fluorescent Unit

Available for two or three 40-watt, or two 100-watt lamps. Broad wiring channel with accessible, enclosed ballast. Can be mounted from chain or conduit, individually or in continuous runs.

RLM Solid Neck Incandescent Reflector
Maximum lighting efficiency for either indoor or outdoor use. Expertly designed, ruggedly built. 75 to 1500 watts.

Distributed Exclusively Through Electrical Wholesalers

Wheeler Skilled Lighting REFLECTORS

Made by Specialists in Lighting Equipment Since 1881

lar to the wood deck skid, but of lighter construction; (6) nesting rings, for use with any skid or pallet of corresponding size. Phillips Mine & Mill Supply Co., Pittsburgh.

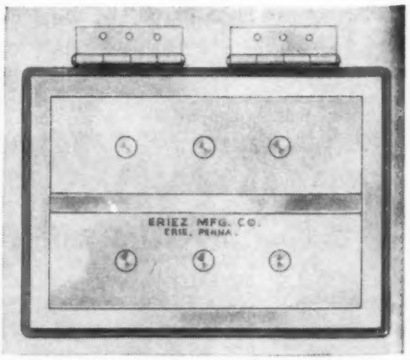
Miniature Welder

Small portable welding unit, designated as Miniature Model J Welder, has no jacks, plugs, magnetic switches, or rotating parts to get out of order. Transformer core is constructed of high-grade silicon steel, im-

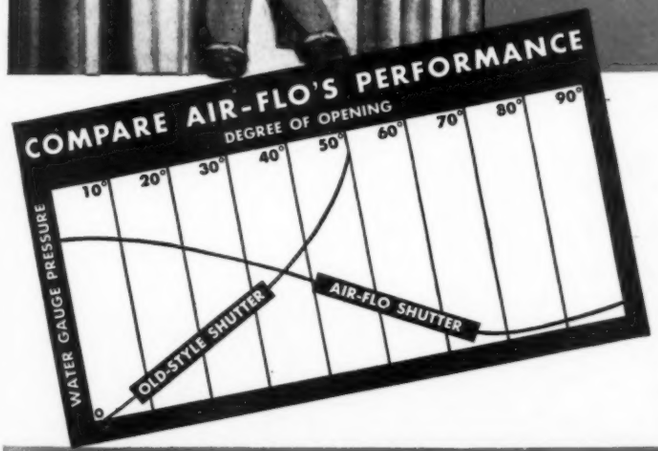
pregnated in insulating varnish, and baked. Coils are of ample capacity to permit a safety factor on overloads, maker states. Unit is 10x14½x16 inches, and weighs 110 pounds. Has 10 welding heats on either 110 or 220 volts. Operating cost is said to be low, and maintenance work negligible. The heavy-gage sheet metal case has two handles, for carrying. Welder operates on any standard power supply. Hampton Electric Mfg. Co., 12th St. and Pine Pl., New Kensington, Pa.

Stainless Steel Magnet

Non-electric magnetic separator, with working surface of stainless steel, is announced. Removes both large and small pieces of iron and steel scrap from ingredients going into the manufacture of drugs and cosmetics, pulp and paper, rubber, petroleum, soap, and other products. Can be installed at any point where raw materials enter a chute or conveyor, attracting and holding ferrous foreign bodies, preventing them from falling into and damaging machinery. Suitable for use in bottom of steel trough, pipeline, or liquid feeding equipment, as well. Edge strips and center in-



Introducing the Revolutionary New



Capacity Loss Is a Thing of the Past

Up to now, the shutter has barred the complete removal of warm air and noxious gases from factories and workrooms. Shutters of ordinary design simply cannot accommodate the full exhaust capacity of ventilating fans, nor can ordinary shutters close tightly enough to keep out cold air. The revolutionary design of the new Air-Flo shutter attains an unprecedented performance peak—for the first time, a shutter does what it is supposed to do—opens to 90° to *let* air out, closes firmly to *keep* air out. Now starting in quantity production, AIR-FLO shutters will be available for your new construction or remodeling. Write today for illustrated descriptive folder.

AIR CONDITIONING PRODUCTS CO.

2340 W. LAFAYETTE BLVD., DETROIT 16, MICHIGAN

• Picking up a load and placing it on the exact right spot is only as efficient as the crane that lifts and carries and lowers its cargo.

Balanced drive gears with automatic oil bath lubrication—permanent alignment—anti-friction bearings—give Shepard Niles cranes precision control operation and more dependability under constant load handling. Shepard Niles cranes are designed and built for tough, long service with a thorough knowledge of the performance expected of them.

* * *

Our staff of engineers are ready today to help you to plan a better, more economical handling system. Write them.

For smooth, constant, dependable lifting and handling, select a Shepard Niles hoist. The completeness of the Shepard Niles line of electric hoists permits the selection of the most efficient lifting and load-moving equipment for any requirement.

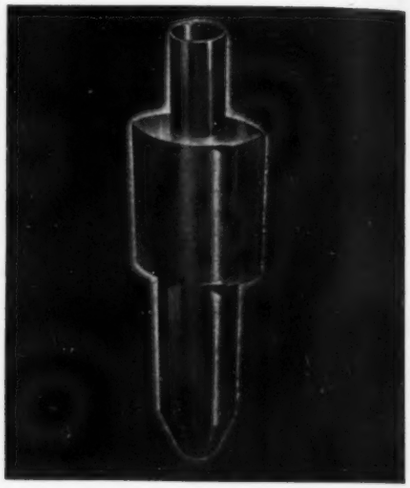
Shepard Niles
CRANE & HOIST CORPORATION

364 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

sulating strip are made of non-magnetic stainless steel, while the two pulling areas on each side of center insulating strip are of magnetic stainless steel, for resistance to rust and corrosion. Magnets require no wiring, power being furnished by Alnico steel magnet castings. Available in any size needed. Eriez Mfg. Co., Erie, Pa.

Air Cleaning Tube

High precipitating efficiency, and elimination of pressure build-up are claimed for air cleaning tube. Used in multiples up to any desired capacity. Clean air is exhausted



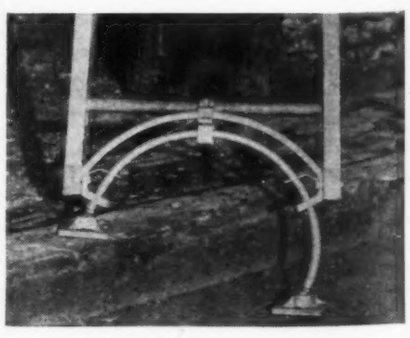
from central tube while dust is precipitated from the bottom. Tube can be used for reclaiming valuable powders, for intakes on diesel and gas engines, for cleaning dust-laden air in industrial and chemical plants, and other applications. Single tube has a capacity of 30 c.f.m. at 4-in. w.g. resistance. Aerotec Co., 61 West Chester Ave., White Plains, N. Y.

Shipping Pallets

Manufacture of shipping pallets and skids, known as Generalift, is announced. The materials handling equipment is designed to meet individual needs. General Box Co., 510 North Dearborn St., Chicago 10.

Ladder-Leveling Base

When attached to a ladder device known as Shur-Foot automatically adjusts itself to ground level and surface conditions under either foot, levels the ladder, and is locked in place by ladder's weight. Step-



SPRAYIT

PORTABLE COMPRESSORS AND SPRAY GUNS

SPRAYIT SERIES 590
½ h.p. Twin Diaphragm compressor. Displacement 5.10 C.F.M. Spraying pressure over 40 lbs. Shown type NU Sprayit Gun.

SPRAYIT SERIES 670
½ h.p. Streamlined Twin Piston Type compressor. Each cylinder has a displacement of 6.8 C.F.M. Air delivery of 4.15 C.F.M. at 45 lbs. spraying pressure. Shown STR Sprayit Gun.

SPRAYIT SERIES 320
¼ h.p. Piston Type compressor. Rated displacement 2.58 C.F.M. Spraying pressure of over 30 lbs. Shown type NU Sprayit Gun.

SPRAYIT SERIES 460
½ h.p. Streamlined Piston Type compressor. Rated displacement 4.25 C.F.M. Actual air delivery of 2.68 C.F.M. at 40 lbs. spraying pressure. Shown with type STR Sprayit Gun.

SPRAYIT SERIES 200
¼ h.p. Diaphragm compressor. Displacement 2.55 C.F.M. Spraying pressure over 30 lbs. Perfectly balanced. Equipped with pop-off valve. Shown with type NU Sprayit Gun and cup. 1 qt. capacity.

Back Again!

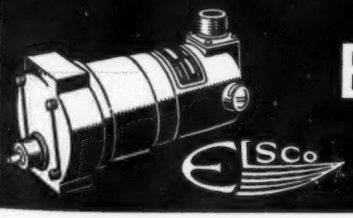
BETTER THAN EVER

● Portable SPRAYIT units, in a wide range of capacities and sizes, are built to solve every portable paint spraying problem. SPRAYIT pioneered this field and has developed equipment of outstanding quality, precision-built to close tolerances throughout. This plus efficient overall design provides maximum production at minimum operating cost.

SPRAYIT portable paint spraying equipment streamlines any painting problem—but for added value—be sure it is *genuine* SPRAYIT *Equipment.*

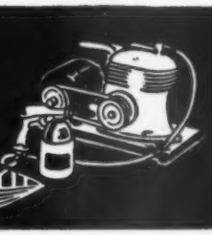
Users who do not know their nearest SPRAYIT dealer are invited to write the factory for this information. Jobbers and dealers who are not yet set up on the SPRAYIT line are invited to contact the factory immediately.

SPRAYIT *Industrial Spray Guns, Air Transformers, Pressure Paint Tanks, etc. are also available once more.*



ELECTRIC SPRAYIT CO.

SHEBOYGAN, WISCONSIN



Ever New Plant Economies from Imagination, Experience, Skill...

How 45 Years of *Engineering*

"PLANT-WIDE TRANSPORTATION"

CAN LOWER YOUR COSTS...

SINCE 1901, when conveyor systems *engineered* by The Alvey-Ferguson Co. began to simplify and make economies in the handling of materials and products, Alvey-Ferguson has been "first in the field" as pioneer and developer of completely co-ordinated plant-wide indoor transportation systems.

Today, as we enter a new decade of ever-increasing speed and efficiency, more and more A-F *engineered* conveyor systems are moving the goods of many of America's foremost manufacturers. Additional scores of efficiency and economy-minded producers are planning to supply their consumers more quickly and at lower cost via the completely coordinated conveyor systems engineered by A-F.

Whatever your materials handling or products handling problem, A-F Conveyor Engineers can help you solve it. Their record of achievement is 45 years long. Won't you write—today?

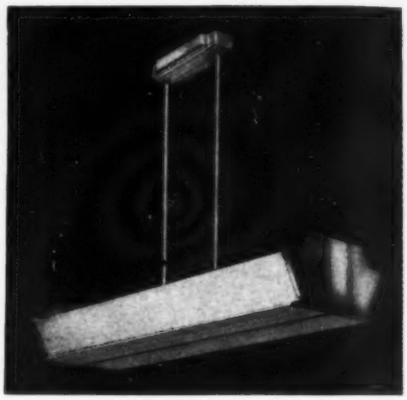
THE ALVEY-FERGUSON COMPANY
131 Disney St. *Offices in Principal Cities* Cincinnati 9, Ohio
Affiliated Corporation:
The Alvey-Ferguson Company of California, P. O. Box 396, Vernon Branch, Los Angeles 11, Calif.

CONVEYING EQUIPMENT
CONVEYING MACHINERY A-F
Alvey-Ferguson
METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

ping on ladder increases locking tension. Shifting the weight does not rock the ladder. Once set in place it stays locked until lifted away. The attachment weighs about 4½ pounds. Has abrasive shoes or rubber cup for groundhold. Truss of special aluminum strengthens bottom of ladder. Strong steel pipe is the leveling member which adjusts to different foot levels. Steel spring keeps proper tension for free leveling and locking, and rail face plates are bolted to bottom, front, and back of rail to increase strength. Rolen Mfg. Co., 751 Liberty St., Painesville, Ohio.

Fluorescent Fixture

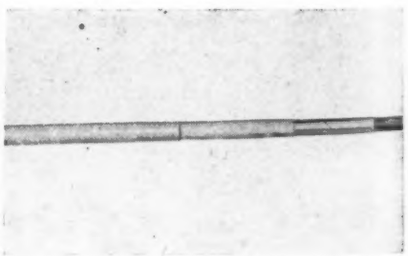
The Van Buren A-2440 Permaflector fluorescent luminaire, one of the "Presidential Series," utilizes four 40-watt T-12 fluorescent lamps on an operating voltage of 110-125, 60-cycle a.c. Also available in 50-cycle. Has over-all length of 48⅛ inches, height of 7⅞ inches, and width of 15⅞ inches. Side panels



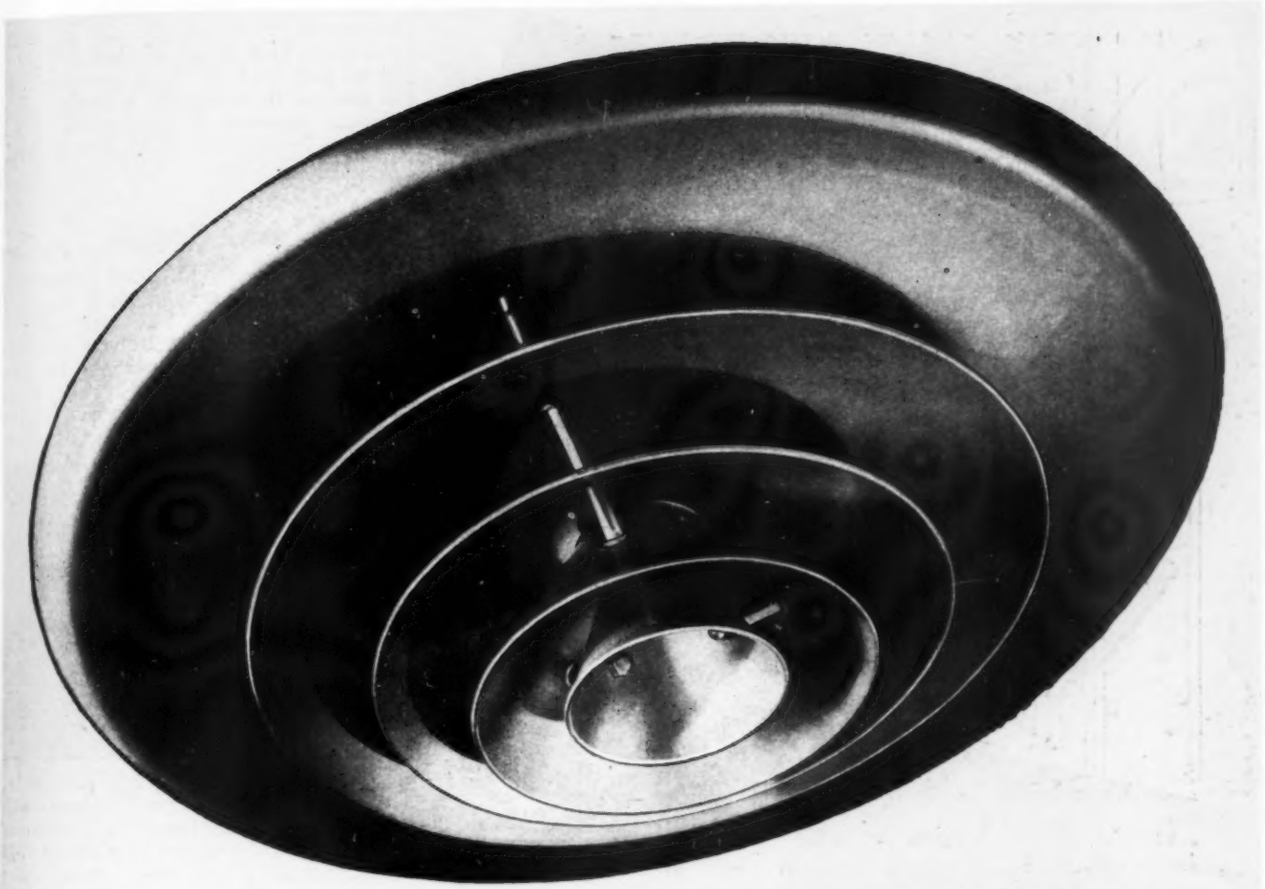
are Skytex Satinol glass, and bottom is formed of two pieces of Skytex clear glass supported by a T-bar center strip. Reflectors are of heat-resisting baked-on white enamel finish; end and outside surfaces are sprayed and baked-on silver finish. Fixture may be surface or suspension mounted as individual units, or in continuous rows. Furnished with 4-lamp high power factor auxiliary and FS-4 starters. The Pittsburgh Reflector Co., Oliver Bldg., Pittsburgh 22.

Lead Wire

Insulated with a moisture-resisting cellulose acetate wrap next to the conductor, as well as a layer of felted asbestos, and lacquered glass braid over-all covering, Deltabeston lead wire is now on the market. Designed



for use with appliances and equipment where medium high temperatures and moisture are present. Maximum operating tem-



There is no substitute for ANEMOSTAT

DRAFTLESS AIR-DISTRIBUTION

Don't risk the success of your air-conditioning or ventilating system by the use of "substitute" air-diffusers.

Without effective air-distribution, no air-conditioning or ventilating system can be a complete success. The ANEMOSTAT air-diffuser will draftlessly and evenly distribute any volume of air at any velocity. This results in the equalization of temperature and humidity throughout the room.

ANEMOSTATS may be applied to existing systems as well as to new installations, regardless of size. The ANEMOSTAT may also be effectively combined with indirect cove lighting or pendant lighting fixtures. The ANEMOSTAT has no moving parts and is easily installed. ANEMOSTATS are giving complete satisfaction in thousands of air-conditioning and ventilating installations.

Write today for full information.

Veteran-ize your personnel! Many discharged war veterans received valuable technical and specialized training. Always consider veterans when you employ. They did their share —now let's all do ours!

ANEMOSTAT

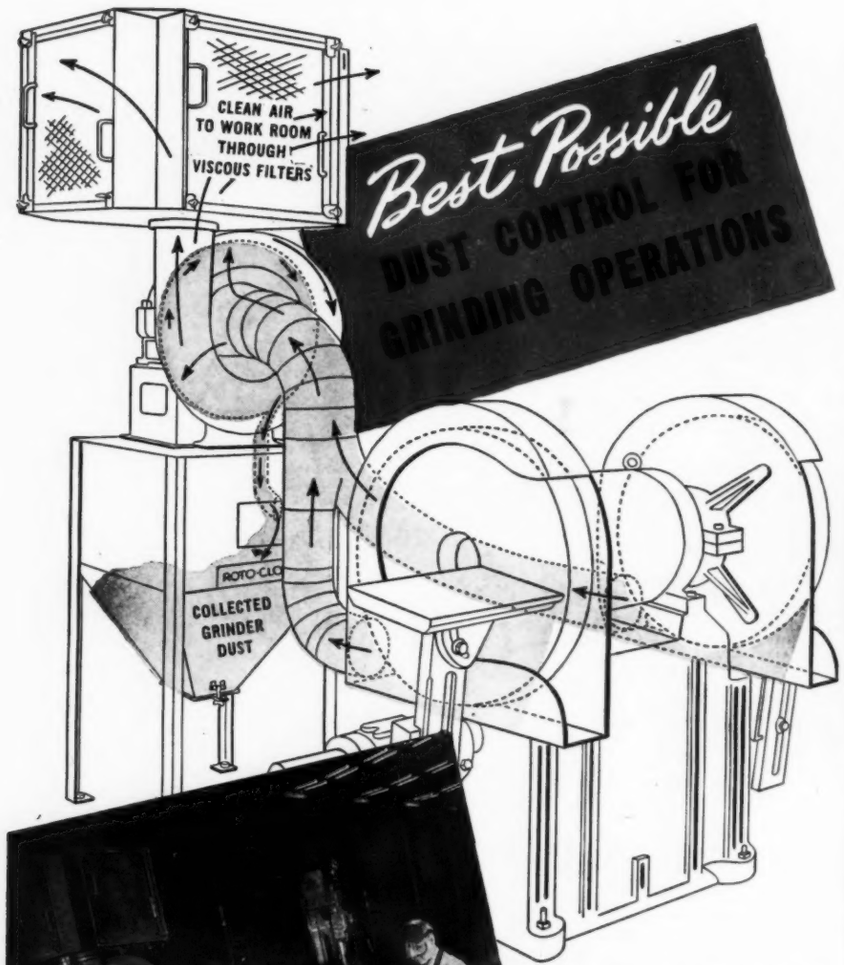
REG. U. S. PAT. OFF.

ANEMOSTAT CORPORATION OF AMERICA

10 EAST 39th STREET NEW YORK 16, N. Y.

AC-1047

"NO AIR-CONDITIONING SYSTEM IS BETTER THAN ITS AIR-DISTRIBUTION"



Viscous filter aftercleaners mounted on the Roto-Clone exhaust allow cleaned air to be recirculated to the workroom.

The phantom view of the Type D Roto-Clone shown above illustrates the simplicity of exhaust ducts and hood arrangement and the ease with which it collects grinder dust. A Roto-Clone dust control system may be either an individual unit serving a single isolated dust producing operation, or it may be of the central type with main duct and branch connections to a number of dust sources.

The proven dynamic principle employed by the Roto-Clone results in a higher percentage of collection of the very small particles and its efficiency is unaffected by changes in air volume or operating speed. Its construction is sturdy and resists the abrasive action of metal dusts, thus assuring long life and freedom from servicing. Send for Bulletin No. 272.

AMERICAN AIR FILTER CO., INC.
Incorporated
361 CENTRAL AVE., LOUISVILLE 8, KENTUCKY
In Canada: Darling Brothers, Ltd., Montreal, P. Q.

ROTO-CLONE
FOR ALL GRINDING OPERATIONS

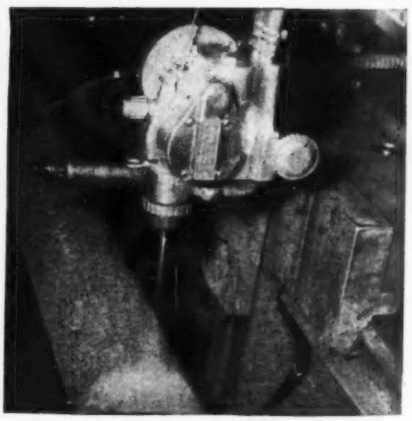
perature is 125 deg. C. Available in white, red, green, blue, brown, or black, the color of the glass braid covering is permanent. It is obtained by dyeing the individual glass threads. Appliance & Merchandise Dept., General Electric Co., 1285 Boston Ave., Bridgeport 2, Conn.

Dust Goggle

Designed to provide safety and comfort for industrial workers, dust goggle is equipped with acetate eyecups individually shaped to conform to contour of right and left eye. They fit snugly against face to keep out dust and powder. Thin wire mesh screen on inside of each side shield gives protection against fine particles. Ventilating system extends over large area to reduce fogging. Goggles can be cleaned with air hose or washed. Lenses are clear Super Armorplate, and retaining rings are of solid fiber. Goggle is available also with rubber cushion. American Optical Co., Southbridge, Mass.

Metallizing Gun

Type Y metallizing gun is designed for mechanical mounting and continuous operation. Use of $\frac{1}{16}$-in. wire, when combined with an acetylene pressure of 15 p.s.i., is said to double spraying speed. Gun is of heavy, rugged construction, with large gears, worms, and bearings which virtually eliminate wear and replacement, according to the manufacturer. Fluid lubrication and built-in forced feed pump, which has no parts to wear, supply lubricant to all bearings. The gun is non-sensitive to gas and oxygen pressure variations under 10 pounds, either while lighting or while spraying. Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y.



EVERY STEP in business from the entering of the order to the writing of instructions, operation of machines or equipment, inspection, packing and shipping, is dependent on *vision* and visual skills.

For every kind of work, a minimum degree of vision ability is required.

Below that minimum the efficiency of the operation is impaired, resulting in slow production, mistakes, spoilage and accidental injury.

The AO Plan for Industrial Safety and Visual Efficiency has been developed to provide industry and members of the Ophthalmic Professions with the advisory services of a group of industrial consultants, the AO Sight-Screener, and service on corrective-protective materials and safety goggles. It also provides the necessary forms, manuals and records for putting the plan in operation.

Write today for "Industrial Visual Efficiency, A Management Opportunity." This brochure describes the plan, its installation and operation, and the benefits to be obtained.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

for Industrial Safety and Visual Efficiency

Complete service on safety goggles and corrective-protective equipment to meet every industrial requirement.

Assistance in the development of a program to educate employees on the value to them of eye protection and visual efficiency.

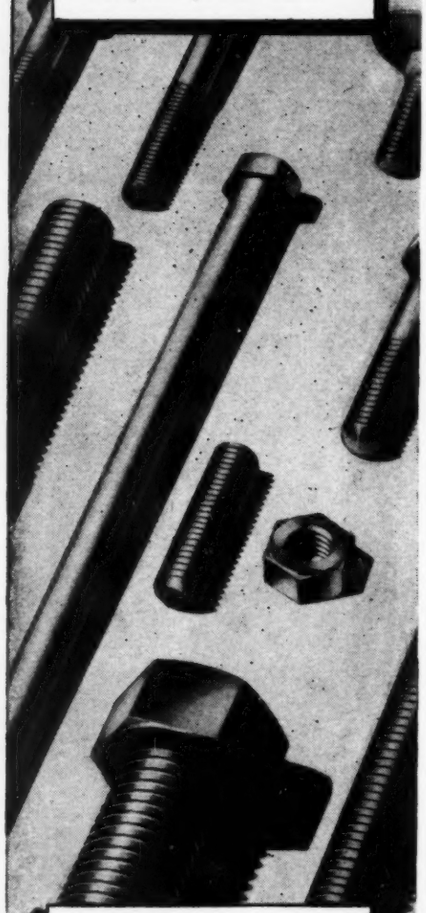
BENEFITS

Improved quality of work
Increased individual output
Reduced spoilage
Fewer accidents
Lowered cost per unit
Elimination of eyestrain, fewer mistakes

USE HEADED AND THREADED FASTENERS FOR ECONOMY AND RELIABILITY

Alloy Steel
BOLTS · NUTS STUDS

Every standard alloy steel — fabricated into bolts, nuts, studs and many special fastenings. Accurately made in standard dimensions or to meet your specifications.



BETTER BOLTS SINCE 1882
A full line in carbon steel, heat-treated alloy steels, stainless steel, silicon bronze, brass, bronze, and monel metal.

PAWTUCKET
THE BOLT MAN
MANUFACTURING COMPANY
327 Pine Street • Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS

YOU WANT TO KNOW

more about the items mentioned on this page

Letters to the addresses given will bring information

• WATERPROOF IGNITION provided by application of "Wetstart." Also restores and protects insulation, and retards battery corrosion. General Detroit Corp., 2202 East Jefferson Ave., Detroit.

• INSPECTING ANODYZING on rivets with an electronic device attached to a rivet sorter, for greater accuracy and speed. Glenn L. Martin Co., Baltimore, Md.

• CUSHIONING METER determines correct type, amount, and placement of protective materials as well as packaging for articles to be shipped. Meter and Instrument Division, General Electric Co., West Lynn, Mass.

• FOG PREVENTIVE for application to windows, goggles, gas masks, and glasses. Merix Photo Co., Dept. 116, 712 Wrigley Bldg., Chicago 11.

• CLEANING METALS with "Troxide" bright dipping formulas to escape common hazards of using sulphuric and nitric acids. Waverly Petroleum Products Co., Drexel Bldg., Philadelphia 6.

• JOB CREDIT TAX PLAN to allow companies one-year tax reductions prorated to number of new employees added. Explained in booklet. R. T. Cornelius, 1621 East Hennepin Ave., Minneapolis 14.

"SPIRIT OF '46" is title of calendar painting using theme of peace, demobilization, and reconversion. Offered to industry in large poster-sized copies. Hercules Powder Co., Wilmington 99, Del.

• ADULT EDUCATION in economics, aided by series of teaching kits. Included are study outlines, pamphlets, film strips,

JUST MY LUCK-- IT'S THE BULL HIMSELF! I'LL GET FIRED SURE FOR SPOILIN' THAT WHEEL!
IT AIN'T THAT BROKEN WHEEL THAT'LL CAUSE HIM TROUBLE-- IT'S WHAT'S LIABLE TO HAPPEN WHEN THEY START GRINDING WITH THE ONES THAT JUST CRACKED AND DIDN'T BREAK!
YOU CAN BET TH' KID WON'T DO THAT AGAIN! THAT'S THE WAY IT ALWAYS IS--SOMEBODY GENERALLY GETS HURT BEFORE SAFETY IS THOUGHT OF!
TOOL CRIB
ROLLING STOCK
J.R. WILLIAMS
T. M. REG. U. S. PAT. OFF.—COPR. 1945 BY NEA SERVICE, INC.

TO PROMOTE SAFETY in grinding wheel operations, a series of "Bull of the Woods" cartoons for use as posters on plant bulletin boards is offered without charge. Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7

20,010 HOURS OF TROUBLE-FREE OPERATION

SUN DIESEL LUBRICANT . . .

Keeps big Diesel-driven compressors running smoothly

Twenty-four hours a day . . . 20,010 hours of almost continuous work . . . no time-out for any but routine maintenance . . . and no apparent wear. That's the record of these four, big, Diesel-driven air-compressors, lubricated with Sun Solnus Oils.

Installed in a huge industrial plant, one week before Pearl Harbor, these 400-h.p. units have given outstanding service. Sun Solnus Oil was used for both Diesel power and air-compressor sides from the very first day . . . was chosen for its low carbon-content . . . its ability to keep rings free and clean . . . the fact that it doesn't form harmful acids or hard, flinty deposits . . . and doesn't break down into thick, sticky sludge.

This record is the kind which Sun industrial products are helping to hang up in hundreds of different plants . . . the kind of record that means continuous production . . . low operating-costs . . . a minimum of time-out . . . reduced labor costs.

Sun products prolong machine-life; save power, materials, and labor; not only in power-plants and factories, large and small, but throughout industry.

The telephone on your desk is a direct wire to the Sun Engineers and service men in your area. Call them in today.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SECRETS OF PETROLEUM SCIENCE REVEALED

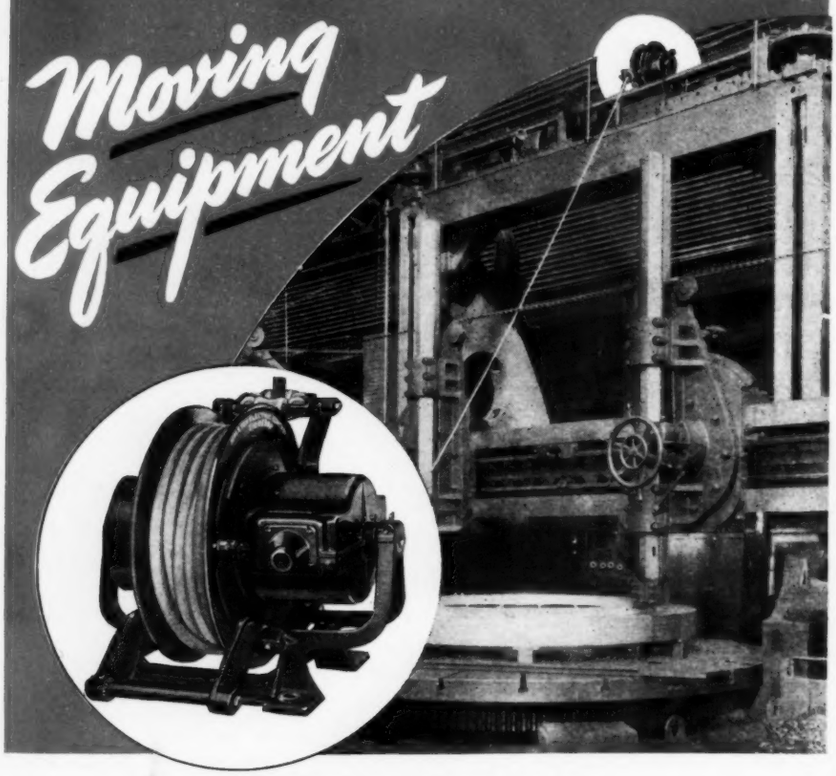
At Booth E-605, National Metal Congress, February 4th to 8th. Complete exhibit of making of petroleum products—producing, refining, transportation, and industrial application. Don't miss it!

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

Saves Cable Repairs and Replacements on

Moving Equipment



APPLETON
CONSTANT DUTY
Reelite

Reg. U. S. Pat. Off.

Keeps Cable Coiled Up Out Of The Way

No tangles, kinks or breaks in conductor cable protected by Appleton Constant Duty Reelite. The cable pays out or winds up, without slack or strain, supplying constant current safely to all types of moving equipment from portable hand tools to giant cranes.

Time losses and cable repairs are reduced to a minimum with Appleton Reelite.

Send Today!...
For Bulletin No. 504 on Appleton Reelites. Complete information on Constant Duty, Portable, and special types. Or see Sweet's File 2a/17.

APPLETON ELECTRIC COMPANY
1715 WELLINGTON AVE. • CHICAGO 13, ILL.
14 Branch Offices and 7 Resident Representatives in all principal markets.

APPLETON ELECTRIC PRODUCTS REG. U.S. PAT. OFF.

APPLETON
CONDUIT FITTINGS • OUTLET AND SWITCH BOXES • EXPLOSION-PROOF FITTINGS • REELITES

lantern slides, and sound records. First five kits deal with foreign trade, full employment, inflation, technological unemployment, and sound investment versus idle savings. For purchase or rental. Address New Tools for Learning, 280 Madison Ave., New York 16.

• ELECTRONIC CONTROL of machine tools for automatic contouring. A stylus follows angles and curves of pattern or templet and controls changes in path of cutting edge to conform. General Electric Co., Schenectady 5.

• COLD STERILIZING especially for dishes and cooking utensils with "Timsol." Solution is said to be non-irritating to skin, and free from odors. Theo. Ross & Associates, 835 West Olympic Blvd., Los Angeles 15.

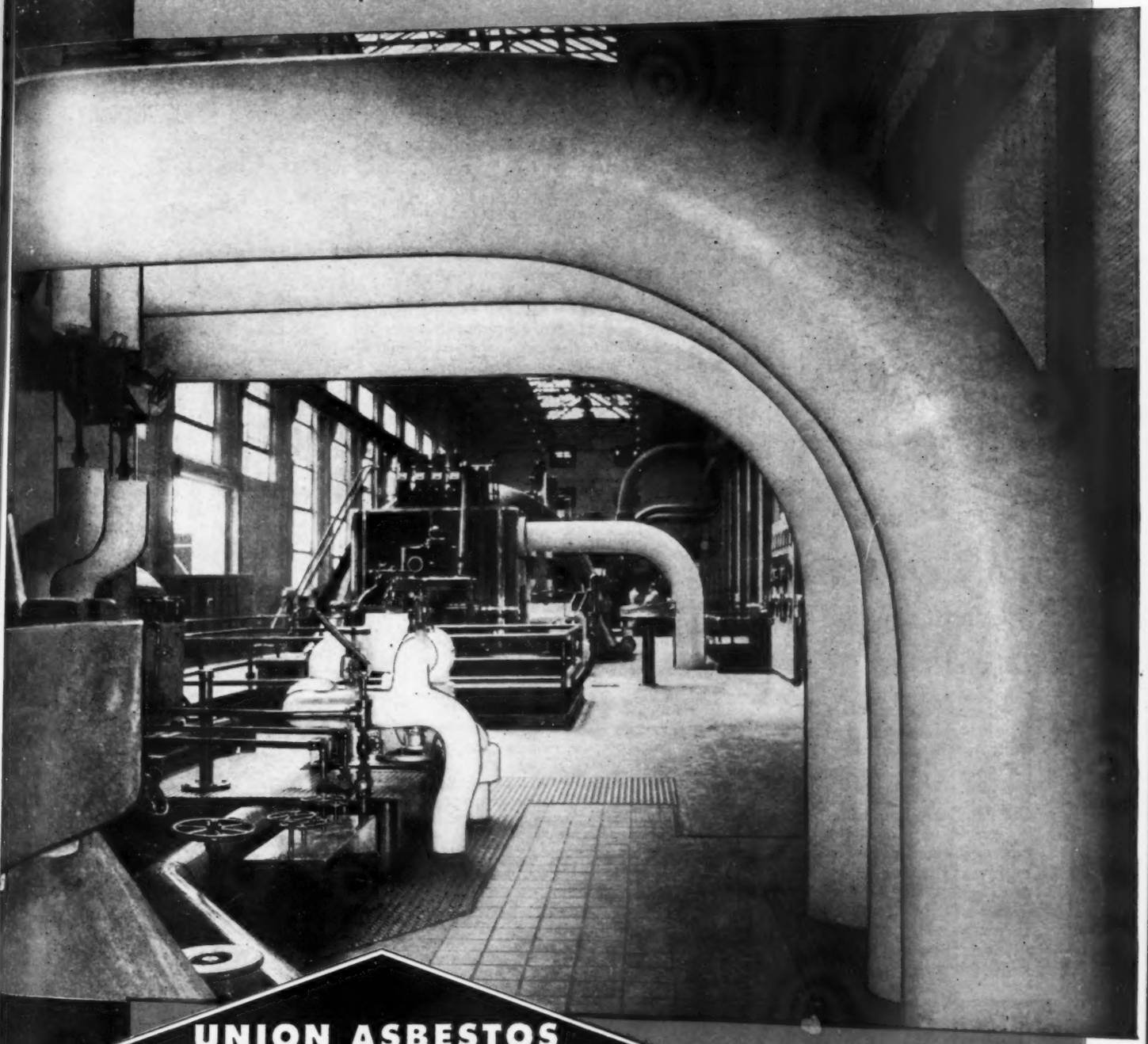
METAL CONTAINER for hermetically sealing electrical equipment such as relays, transformers, and rectifiers. Lid is fitted with one of 26 types of Fusite glass-to-metal terminals, soldered or welded in place. Cincinnati Electric Products Co., Carthage at Hannaford Streets, Cincinnati 12.

• COATING MAGNESIUM ALLOYS by Manodyz electrolytic process, which adds protection and has decorative value as well. Hanson-Van Winkle-Munning Co., Matawan, N. J.

• INSIDE-PLATED PIPE using nickel surface on steel as a substitute for alloy pipe, useful where corrosion is a problem. Bart Manufacturing Co., 227 Main St., Belleville 9, N. J.

• UNIFORM HEATING of irregularly shaped materials by an electronic "blowtorch." Device hurls ultra-short waves at object to be polymerized, cured, or bonded, instead of having object placed between two electrodes. Westinghouse Electric Corp., Pittsburgh.

LOSS" WON'T STALK THIS PLANT . . .



UNION ASBESTOS
MEANS PROGRESS IN INSULATION
AND RUBBER CO.

PLANTS: 1821 S. 54th Ave., Cicero, Ill. • Paterson, N. J. • Blue Island, Ill.
OFFICES: Cicero, Ill. • Chicago, Ill. • New York, N. Y. • San Francisco, Calif.

It's New and It's Terrific
ANOTHER
NOX-RUST
The Master RUST PREVENTIVE
1st
Now:
NOX-RUST CLEAR COAT
forms a
TRANSPARENT
Protective Film
Against RUST!
The perfect rustproofing where high-grade protection, transparency, and non-removability is the aim.
CLEAR COAT comes in light, medium and heavy consistencies. Forms a highly adhesive, dry coating . . . The lightest grade of CLEAR COAT is practically invisible. Identification markings show through plainly.
NOX-RUST CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS
2459 S. HALSTED ST.
CHICAGO 8

Significant Labor Developments

BENJAMIN WERNE, Lecturer in Government Regulations, New York University, Member of the New York Bar

Period Surveyed: November 1 to December 1

TREND INDICATORS

Contract Clause for Veteran's Preference Denied

ON THE GROUND that it would not impose upon one employer a greater contractual obligation than that imposed upon others in the same industry or area, the NWLB denied a union's request for a contractual clause giving returning veterans the right to replace employees with less seniority in the same craft in the plant where the veteran's old job has been eliminated in his absence. (New York, New Jersey Milk Distributors, WLB)

Veteran's Claim to Old Job Denied

Upholding a company's refusal to reinstate a veteran in his old job, which had been expanded to include supervisory duties, an arbitrator held the company to be acting within its rights in offering the veteran a higher-rated job—i.e., one paying a higher wage rate but not encompassing supervisory work. The union contended that the veteran was entitled to the old job as expanded, or at least a chance at it, since his seniority was greater than that of the present holder of the job, thus invoking the provisions of the contract making promotions subject to seniority and ability. Rejecting the union's position, the arbitrator maintained that the company fulfilled its obligation under the Selective Service Act, since the job offered was better than the law required and the contract clause referred to was not controlling in promoting to supervisory positions, because the choice in the latter case lies entirely with the company as provided in the contract. (In re Arbitration between N. Y. & Brooklyn Casket Company and Casket Makers' Local of United Brotherhood of Carpenters & Joiners of America, Local 3128)

Employer Liable for Overtime Despite Counter Instructions

Because the employer keeps signs posted or gives personal instruction forbidding violation of the Public Contracts Act it does not mean that he relieves himself of liability for violation of the Act. In one case, although the employer expressly forbade overtime as evidenced by the posting of a notice of that fact, he was still held liable for overtime pay where the employees actually did work overtime. In another instance, an employer was held responsible for the work done on a government job by a minor, although the employer instructed the minor to keep away from the government contract work. (Dize Awning & Tent Company; Burns Machine & Shipbuilding Company, Public Contracts Act Administrator)

Pay Plan Held Illegal

An employer's pay plan under which a normal rate of pay was fixed, based on the number of hours subject to call exceeding the statutory maximum and providing for time and one-half the normal rate for overtime, was deemed violative of the Wage-Hour Law. The compensation received under this plan equaled the wages received before the passage of the Act. The court found that the number of hours worked by the employees were about 15 hours less than those to which they were subject to call, thus making the contract rate a fictitious one. In reality overtime hours worked were not compensated for at time and one-half. Rejecting the employer's defense that his plan paralleled the Belo contract type, the court stated, "If the Supreme Court has not repudiated its holding in the Belo case, it has come so close as to leave no room for its application except upon an identical state of facts." (Walling vs. Uhlmann Grain Company, CCA-7)

Held Under the Act

Employees engaged in unloading petroleum products at the bulk plants of a company operating an oil refinery and distributing petroleum products, since such unloading constitutes part of the interstate shipment of the products. The court pointed out that the unloading of these goods at the bulk plants did not constitute a termination of the interstate movement of the goods, but rather was a part of the movement. Nor was the stop at the terminals to blend and season the gasoline before shipment by tank car to bulk plants considered a termination of the interstate movement. The termination point is reached, however, when the goods are received and stored at the company's retail service stations. Thus, the Act would not be applicable to those employees at the retail stations nor to those engaged in driving across state lines to and from the retail stores. (Keen vs. Mid-Continent Petroleum Corporation, USDC, N. La.)

Employees of a cold storage plant whose facilities are utilized exclusively by companies engaged in buying and selling the

How *NOT* to Pile Up Mileage *Needlessly* on Your Scrubbing Machine

It's a matter of *teamwork*... teamwork of cleanser and scrubbing machine. But that can be achieved only by using a cleanser that *keeps pace* with the speed of machine-scrubbing.

Setol, a mineral oil solvent for use on mill and factory floors, is just such a cleanser. In fact, *Setol* is specially compounded for use in scrubbing machines. It acts *instantaneously* in emulsifying grimy oil and grease . . . gives cleaning action with every turn of the brushes. This enables the machine to complete the cleaning process in minimum operating time.

Setol is a product of *Finnell's own powder mill*, as are these five other *Finnell Cleansers*, all of which are specially compounded to work in scrubbing machines: *Finola Scouring Powder*, for heavy duty scrubbing of smooth, hard surface floors and some wood floors . . . *Solar Soap Powder*, for use wherever a good *soap* powder is required . . . *Finnell Rubber Cleaner* . . . *Century Scouring Powder*, a mild abrasive cleanser . . . and *Asesco Solvent Cleanser* and Water Softener.

For consultation or literature, phone or write nearest *Finnell* branch or Finnell System, Inc., 2501 East Street, Elkhart, Indiana. Canadian Office: Ottawa, Ontario.

IF YOU NEED NEW SCRUBBING EQUIPMENT . . . investigate the advantages of a Job-Fitted Finnell.

FINNELL SYSTEM, INC.

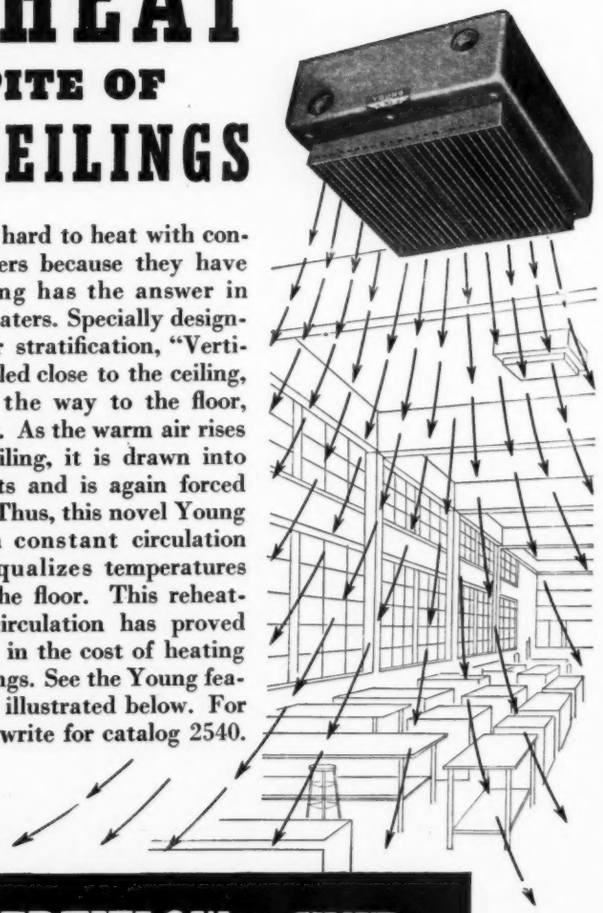
Pioneers and Specialists in

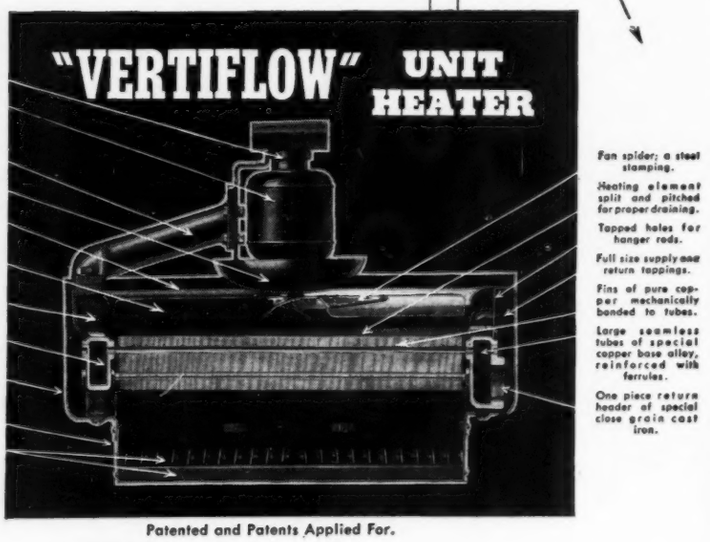
FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

BRANCHES IN ALL PRINCIPAL CITIES

GET HEAT
IN SPITE OF
HIGH CEILINGS

Many buildings are hard to heat with conventional unit heaters because they have high ceilings. Young has the answer in "Vertiflow" Unit Heaters. Specially designed to overcome air stratification, "Vertiflow" Heaters, installed close to the ceiling, force warm air all the way to the floor, where it spreads out. As the warm air rises and reaches the ceiling, it is drawn into the "Vertiflow" units and is again forced down to floor level. Thus, this novel Young Heater maintains a constant circulation of warm air that equalizes temperatures at the ceiling and the floor. This reheating and constant circulation has proved an important factor in the cost of heating high ceilinged buildings. See the Young features of construction illustrated below. For further information write for catalog 2540.




"VERTIFLOW" UNIT HEATER
Rubber insulated motor mounting.
Specially designed motors for unit heater application.
Patented "STREAMAIRE" motor bracket.
Insulated shield for motor protection.
Special aerodynamic fan shroud.
Fans designed for maximum air delivery and quiet operation.
Motor bracket support an integral part of end tank.
One piece cast end tank.
Casing insulated; of welded construction, ribbed and braced for strength.
Diffuser casing.
Diffuser louvers adjustable to give proper air throw from any height.
Fan spider; a steel stamping.
Heating element split and pitched for proper draining.
Tapped holes for hanger rods.
Full size supply and return tappings.
Fins of pure copper mechanically bonded to tubes.
Large seamless tubes of special copper base alloy, reinforced with ferrules.
One piece return header of special close grain cast iron.

Patented and Patents Applied For.

YOUNG
HEAT TRANSFER PRODUCTS

Manufacturers of Oil Coolers • Gar, Gasoline, Diesel Engine Cooling Radiators • Intercoolers • Heat Exchangers • Engine Jacket Water Coolers • Unit Heaters • Convectors • Condensers • Evaporators • Air Conditioning Units • Heating and Cooling Coils • Complete Line of Aircraft Heat Transfer Equipment.

YOUNG RADIATOR CO., Dept. 126-A Racine, Wisconsin, U. S. A.

Application Engineers in Principal Cities

goods which pass through the plant. Approximately 7 percent of all work performed by employees was devoted to handling interstate shipments. (Walling vs. Public Quick Freezing & Cold Storage Company, USDC, S. Fla.)

Artists employed in the production of still pictures or "frames" for Navy training films, since their work is not "predominantly original and creative" enough to exempt them as professional employees under the Act. The fact that the employee has the talent and training for original and creative work will not serve as a basis for exempting him, if these talents are not used by the employer. (Stanger vs. Vocafilm Corporation, CCA-2)

Maintenance and construction employees of two cooperatives distributing electricity to local agricultural and industrial consumers. The court stated that it was not necessary that these employees be engaged in the physical production of the product to enjoy the benefits of the Act, since the Act encompasses all employees whose work is necessary to production of goods for commerce, although, in this case, the production was constant and consistent, which basis the court used for its decision. (Phillips vs. Meeker Cooperative Light & Power Association, USDC, D. Minn.)

Motion picture distributor's booker, who scheduled films shipped from outside the state, kept films in order, and forwarded films from one exhibitor to another, since his participation in keeping the films in circulation engaged him in interstate commerce. (Republic Pictures Corporation vs. Kappler, CCA-8)

Held Not "Employees"

Armed guards, who were supplied by a municipal police commission to protect a large industrial plant, since the commission acted as an independent contractor in exercising the control over hiring, training, swearing in, and discharging of the guards. Moreover, the commission had complete control over their wages, assignments, and rules governing their conduct. (Dugas vs. Nashua Mfg. Company, USDC, N. H.)

Wage-Hour Penalties Deductible

Liquidated damages and attorney's fees paid by employers pursuant to the Wage-Hour Law may be deducted as business expenses for income tax purposes. The Bureau of Internal Revenue, in so ruling, reasoned that such payments allowed by the courts in employee wage suits brought under the Wage-Hour Law were not to serve as a punitive measure but to "constitute compensation for delay in the payment of sums due under the Act."

Held Time Worked

Time spent by employees in traveling from the outer gate of the plant to their work departments and returning from the time office to the outer gate at the end of the shift. The court declared such time compensable on the ground that while traveling the employees were subject to company regulations, were required to expend mental and physical energy, and were performing

DIAMONDS IN A

New and Improved Vitrified Bond

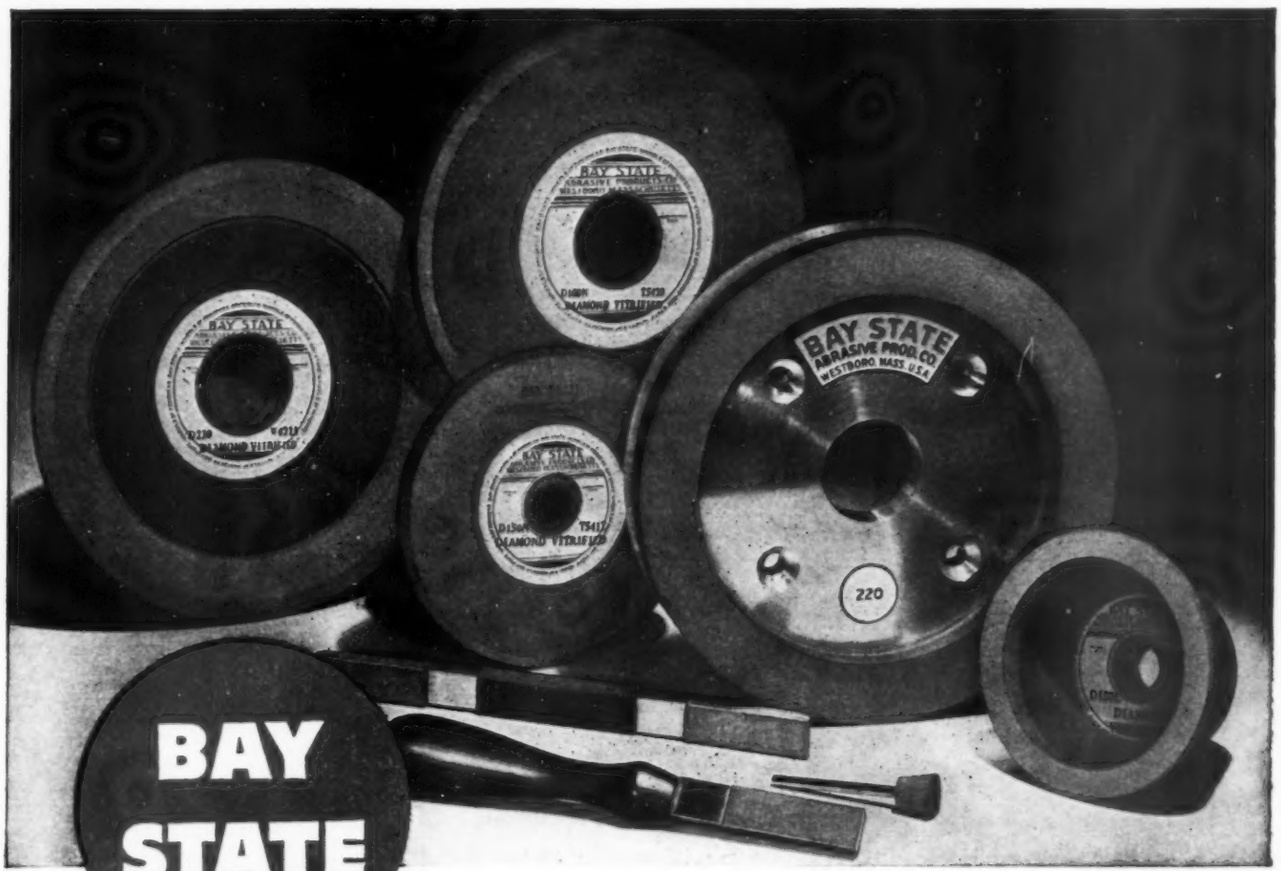
A new vitrified bond designed expressly for diamond abrasive makes a lusty new champion in the grinding of cemented carbide tools and other super-hard substances! The Bay State line of diamond abrasives (resinoid bonded, excellent for many precision and form-grinding operations; and metal bonded, best suited for off-hand grinding jobs) is now supplemented by a new *vitrified* bond.

Considerable research and experiment, together with thorough testing in actual use, have proved the superiority of this Bay State development. Now, the unparalleled abrasive power of diamonds gains the advantages of vitrified bonding — great strength and rigidity, plus faster, cooler cutting action. Results are long life, hair-fine accuracy and lower grinding cost per tool — important additions to the already high economy and efficiency of diamond abrasive grinding.

Typically, Bay State makes available to you this latest achievement, in a wide range of standard shapes and sizes . . . every one of them built to uphold Bay State's record of *top performance consistently duplicated.*

Write for Bulletin #1980, containing full information on Bay State Resinoid, Metal and Vitrified Bonded Diamond Abrasives.

BAY STATE ABRASIVE PRODUCTS CO.
5 Union Street, Westboro, Mass.



BAY STATE

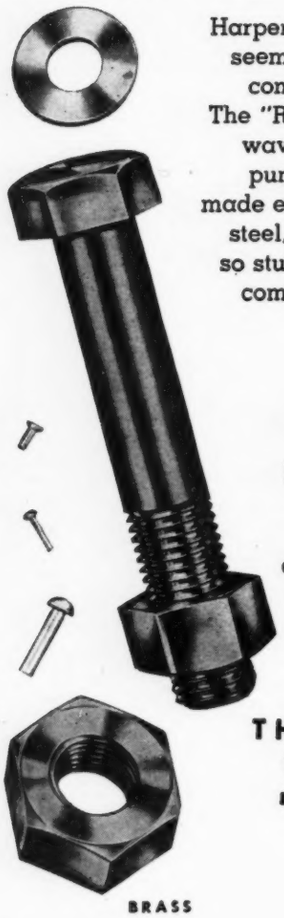
ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS

in spite of the elements

Harper Everlasting Fastenings, at first glance, may seem remote from the Rock of Gibraltar, but the comparison is closer than you might suppose. The "Rock" has withstood the elements of wind and wave and time for centuries. To all intents and purposes it is Everlasting. Harper fastenings, made exclusively from non-ferrous metals or stainless steel, also resist the elements, rust and corrosion so stubbornly that they are considered Everlasting compared with common steel—or the products in which they are used.



everlasting fastenings

Harper Everlasting Fastenings may be ordered from a stock of over 5000 items including bolts, nuts, screws, washers, rivets, nails and special fastenings. Other special fastenings are made to order quickly from large stocks of raw material. Write for 104 page catalog.

THE H. M. HARPER COMPANY
2651 Fletcher Street . Chicago 18, Illinois

BRANCH OFFICES: New York City • Philadelphia • Los Angeles
Milwaukee • Cincinnati • Houston
Representatives in Principal Cities

BRASS
BRONZES
COPPER
MONEL
STAINLESS

HARPER
Chicago

LABOR DEVELOPMENTS ***(continued)***

"work" for the company's benefit. (Ulle et al vs. Diamond Alkali Company, USDC, N. Ohio)

Time spent by a company's hourly rated personnel officer in organizing, after work hours, entertainment for the sale of war bonds and sports events for the company's recreational program. However, when the employee was later placed on a salaried basis and made an administrative employee, he was thus exempted from the Act and would not be entitled to overtime for his work on the recreational program. (Gorchakoff vs. California Shipbuilding Corporation, USDC, S. Calif.)

Held Not Under the Act

Employee engaged in constructing, repairing, and maintaining storage tanks in which the goods of a company producing, refining, storing, and distributing petroleum products in interstate commerce are stored for retail distribution to consumers. The court pointed out that the activities of the worker were confined to the movement of goods after they had been produced, thus rendering the "production for commerce" test inapplicable. He could not be considered "engaged in commerce," since the goods came to rest before his work began. The fact that the employee did the same work in various states and transferred gasoline from carriers to storage tanks does not bring him within the purview of the Act, since the work is conducted in the company's service establishments in these states and thus exempts him from the Act. (Texas Company vs. Pitman, Ga. Ct. of Appeals)

WAR LABOR BOARD

* *New Wage-Price Policy*

Under the new Executive Order 9651, the following three classes of increases are designated as approvable for pricing purposes: (1) Increases to equalize employees' wages with the rise in the cost of living since January, 1941; (2) increases to correct inequities between plants in the same industry or area; (3) increases necessary to attract sufficient manpower to insure full production in an industry deemed essential to reconversion by the Stabilization Director.

Petition for price relief by employers can be made upon receiving approval of the increase or at a subsequent date. However, such approval does not insure approval by the OPA of a price increase. Employers may also institute a wage increase of one of these three types without WLB approval for a test period, generally 6 months, and later seek approval to use this as a basis for price relief petition.

* *Increases Permitted*

Those employers who increased salaries during wartime to compensate salaried employees for the longer wartime work week may retain the higher salaries despite the fact that the work week has been reduced;

* In this and the following classification items marked with an asterisk also are considered to be trend indicators.

Every Piece

IS A Precision PART IN A WHITNEY ROLLER CHAIN

Plates, punched from alloy stock, are heat-treated for maximum strength and toughness.

Pins have high shear value and resistance to wear. They are case hardened and centerless ground.

Bushings are die drawn from selected alloy steels, properly case hardened; held to close limits.

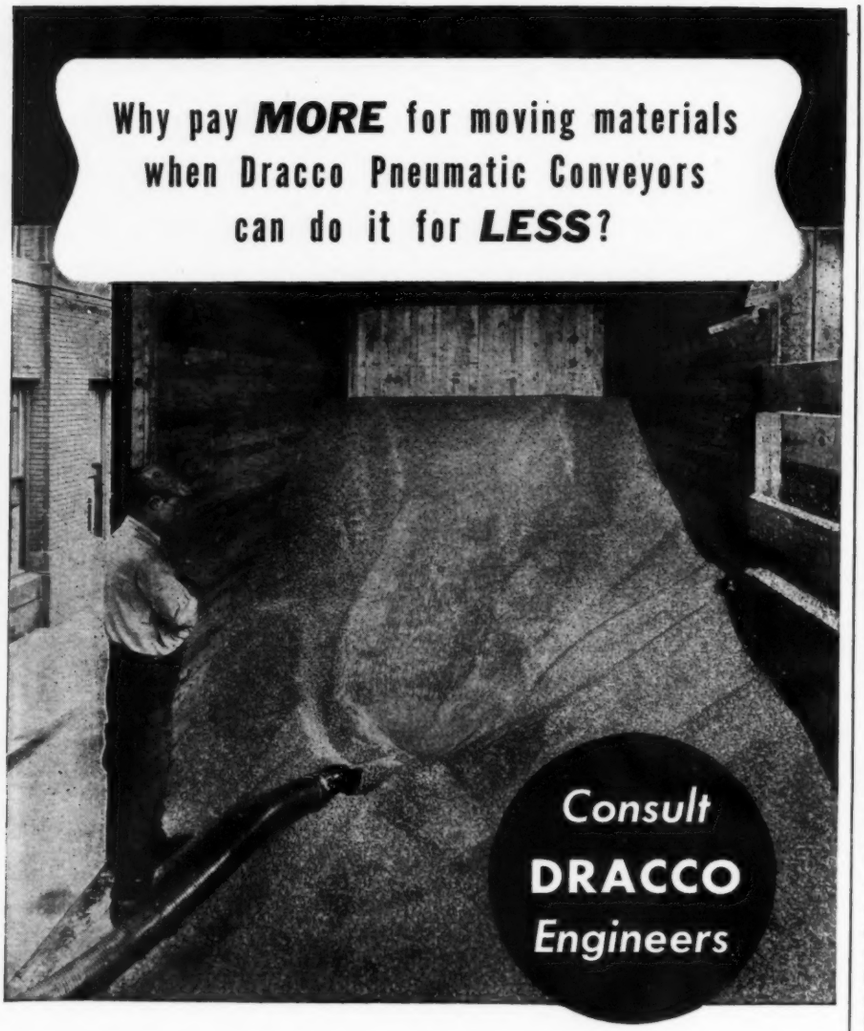
Rolls, die drawn or turned from solid alloy bars, are heat-treated for toughness.

Precision parts, accurately joined, give Whitney Roller Chains the power-plus needed to insure top performance. These rugged chains stand up under long forced runs—keep full power flowing at constant speeds—have ample strength to meet shock loads.

Whitney Roller Chains—made in standard and heavy series, single and multiple widths, cottered detachable and riveted types, in pitches from $\frac{3}{8}''$ to $2\frac{1}{2}''$—fit practically all power transmission drive requirements. Write for complete specifications.

The WHITNEY Chain & Mfg. Co.

HARTFORD, CONN.



Millions of dollars are spent each year moving chemicals, grains and granular materials. To meet postwar competition it will pay to move materials as economically as possible. DRACCO Pneumatic Conveyors are used by many because they reduce handling costs to the MINIMUM. A big saving in labor is made because a DRACCO Pneumatic Conveyor and ONE man replaces SEVERAL men and will also do a much better job. Why not have DRACCO Engineers check your present methods? They have made tremendous savings for many.

For Further Information Write

DRACCO CORPORATION

4091 E. 116th St., Cleveland 5, Ohio *New York Office: 130 W. 42nd St.*

DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

no approval from SSU is required if the increases do not furnish a basis for seeking price relief or increase costs to the government. If, however, relief is sought, and costs to the government are increased, SSU approval must be obtained before continuing the payment of the increased salaries.

* *Increase Awarded*

Pursuant to the bracket principle and Executive Order 9599 which permits the award of increases to correct "gross inequities" or "inequities which would interfere with the effective transition of the peacetime economy," a RWLB awarded the employees of a foundry a 4-cent general increase on a finding that an inequity existed between the rates of the company involved and other companies. (Griffin Wheel Company, RWLB-XI)

Increase Prior to August 18

As of August 18, 1945, unauthorized increases put into effect will be considered legal despite the fact that the board never approved such increases. However, that portion of illegal wages paid out before this date will still be the subject for penalty under wage stabilization regulations.

* *RWLB Denies Intraplant Correction*

A RWLB refused to correct intraplant wage inequalities arising from a previous order issued by another regional board which had original jurisdiction over the case. The latter board had ordered a 10-cent reduction in the wage rates of new employees hired by a company taking over the plant and facilities of an ordnance works. The reduction was to conform the employees' wage rates with those in the area, but delay in the issuance of the order and an unexpectedly large turnover in the plant created the inequity now protested by the union. The regional board presently involved not only refused to correct the prior order but also deemed the wage reduction not in violation of Executive Order 9250, banning such decreases, since the Order prohibits such reductions only when initiated by employers but not when ordered by the board. (General Motors Corporation, RWLB-XI)

* *Incentive Payments Ordered*

Failure to keep its contractual promise to establish an incentive plan for non-production workers, subjected a company to the payment of retroactive wage increases in an amount equal to the sums the employees would have earned under the incentive plan. (Bendix Aviation Corp. RWLB-II)

* *Veterans' Vacation Rights*

Contractual requirements for vacation benefits were set aside by a RWLB where they served to work a hardship on returned veterans during their first year of reemployment. Thus the company was ordered to waive the requirement that the veteran-employee be in the company's employ at least 60 percent of the pay periods in the 12 months preceding the vacation. (Allis-Chalmers Manufacturing Company, RWLB-VI)

Another regional board ordered a company which computed vacation pay at 2 percent of the employees' annual pay to grant veterans who did not work a full

"TRANSFAX laid out all these parts on one plate . . . *in only 8 minutes!*"

Let Transfax put your drawings directly on metal, plastics, rubber... along with precise instructions for cutting, drilling, or welding

In operations of from a few to several thousand industrial units, the Kodak TRANSFAX PROCESS wins approval for speeding production . . . makes previously unheard-of savings in time and labor . . .

With line-for-line accuracy, Transfax puts the original drawings from your Engineering Department directly on the metal, plywood, plastics, or rubber . . . ends laborious scribing . . . ends costly, time-consuming errors.

Where layouts and templates are complex . . . where instructions as well as dimensions should be on every piece to be fabricated . . . where accurate lines and points are needed to guide the welder or the man at the drill-press or cutting machine . . . the value of Transfax goes unchallenged. And Transfax withstands rough handling. Even the cutting torch won't erase it except by direct contact.

Transfax is surprisingly simple to install. No special equipment is needed. No special training of workers. In any ordinary room—using a spray gun, a watering hose, and an arc or mercury vapor lamp, Transfax gets big, 8-foot plates ready for fabrication *in 8 minutes!*

For full information on this revolutionary, new Transfax Process, clip and mail the coupon *today*. Now is the time to begin taking advantage of the economies of Transfax.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

TRANSFAX

SAVES TIME • ENDS ERROR
SPEEDS PRODUCTION

FREE FOLDER—
CLIP COUPON

Gentlemen: I want to know more about TRANSFAX, its many applications and economies. Please send my copy of the folder to:

NAME_____

STREET_____

CITY_____ ZONE_____ STATE_____

Kodak

An idea on competition in COSTS

PERHAPS you have a new product . . . and are working to get its cost down to meet competition.

In the fitting of machine parts, Laminum shims are saving important hours. You simply *peel* your precision from the solid shim . . . with certainty of accuracy because of the uniform gauge of its laminations. Bulletin on request.

Laminum shims are cut to your specifications. For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Inc.

54 Union Street Glenbrook, Conn.

LAMINUM
TRADE MARK
THE SOLID SHIM THAT peels FOR ADJUSTMENT

2220

year before this vacation a sum equal to 2 percent of the amount computed at 52 times their weekly earnings after reemployment. (L. H. Gilmer Company, RWLB-II)

* *WLB Refuses Wage Cases*

The WLB has announced that it will not handle those wage cases in which unions' wage demands were denied under wartime wage stabilization regulations, but which could be reopened in the event of a change in WLB policy. The board is of the opinion that the reconversion policy gives employers and unions sufficient leeway to adjust their differences in collective bargaining.

* *Hours Reduced*

On the basis of industry-area practice, a RWLB ordered a reduction in a 40-hour week to 37½ hours without a reduction in wages. The board found the shorter work week to prevail in the area for the industry. (Nassau Brassiere Co., Inc., RWLB-II)

Severance Pay Granted

On like ground, the same regional board ordered three New York City film exchanges to make provision for maximum severance payments of 3 weeks' pay to employees discharged for other than cause. (United Artists Corporation, RWLB-II)

* *Time Worked*

Thirty minutes spent by the employees of a carbon black plant in getting cleaned up at the end of the shift was made compensable by a RWLB. The board, in making the award, declared that a substantial portion of the industry had a similar practice. However, it specifically prohibited the company from counting the 30 minutes as time worked for computing overtime. (Columbia Carbide Company, RWLB-VIII)

In another case the national board refused a union's request to liberalize the present practice of compensating a small group of employees working with paint, oil, or grease for clean-up time, and extend the practice to all employees doing "dirty" work. (Douglas Aircraft Co., Inc., WLB)

* *Union Security*

Although a maintenance-of-membership contract expires, the employer's obligation to hold employees to their duty to remain union members is not eliminated. So ruling, an arbitrator ordered that the rehiring of an employee discharged for failure to pay his union dues during the contract year be made conditional to the individual's reinstatement in the union. (In re Arbitration between United Shoe Machinery Corporation and United Electrical, Radio & Machine Workers of America)

Where an employee is discharged under a maintenance-of-membership contract, he may not be reemployed in another job by the employer although this job be outside the bargaining unit. Thus, an arbitrator ruled that an employee properly discharged under the maintenance-of-membership contract could not be rehired as a plant foreman, although the latter job was not covered by the bargaining unit. To permit such action on the part of the employer would be to violate the spirit and intent of the maintenance-of-membership contract. (In

CONTINUOUS CENTRIFUGING...

CLEANS FACTORY OIL

QUICKER and MORE THOROUGHLY

WHEN it comes to purifying oil, some plants even today are using methods that are as impractical as they are out of date. Gravity settling, for example, often works — after a fashion. So will certain other means, such as filtering. But there is a much ***better*** and more ***effective*** way to keep oil in good condition.

DE LAVAL Oil Purifiers and Clarifiers by means of centrifugal force instantaneously remove dirt, metallic particles and water. Centrifugal force is many thousand times stronger than gravity and purifies the oil so thoroughly that it will perform at full efficiency for exceptionally long periods.

A cutting oil reclamation system, for example, is only one of many different possibilities for using De Laval Centrifugals. Each application has its own specific advantages, such as longer life of cutting tools, better work turned out, longer life of oil, and many others.

Perhaps your own plant offers opportunities to use De Laval continuous purification to good advantage; write for Bulletin FF.

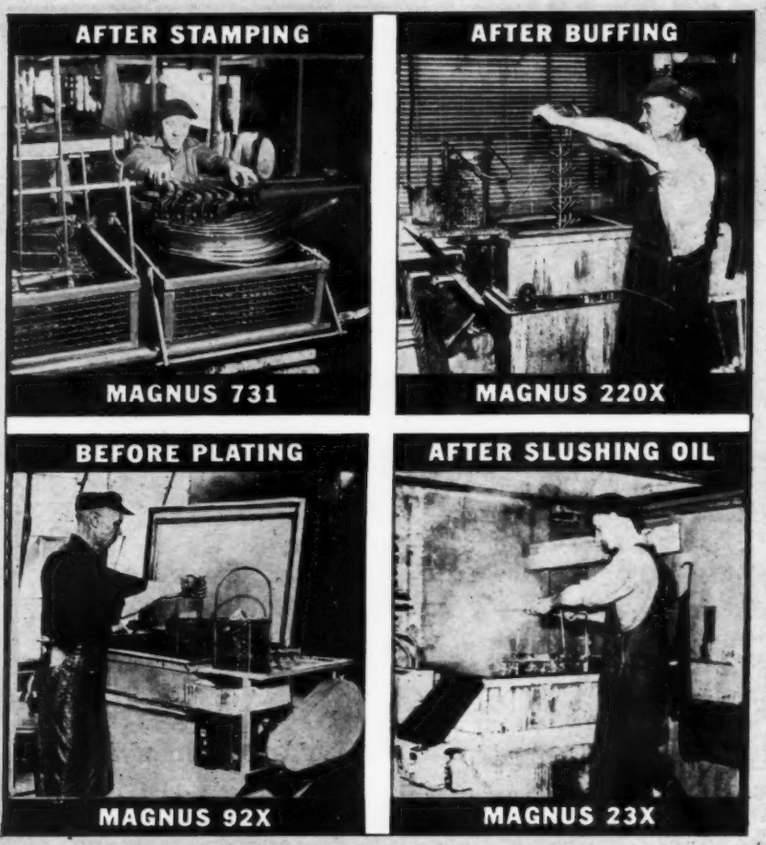
★ ★ ★

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 19
THE DE LAVAL COMPANY, Limited
MONTREAL PETERBOROUGH WINNIPEG VANCOUVER

DE LAVAL PURIFIERS and CLARIFIERS *for Factory Oils*

for GREATER OPERATING EFFICIENCY

CLEAN METALS FASTER... BETTER and at LOWER COSTS



The wide range of metal cleaning problems faced by industry makes it impossible to provide one universal cleaning material to meet all requirements. The right cleaner for a job depends on the kind of metal or metals being cleaned, the nature of the dirt, the purpose of the cleaning operation and, above all, the degree of cleanliness required.

But when the cleaner best suited to the job is selected, cleaning speed and results can be greatly improved by using it in the cleaning machine designed to provide the most efficient contact of the cleaning solution with the work.

Use the RIGHT Magnus Cleaner in the Magnus Aja-Dip Cleaning Machine

(Patented)

The Magnus Aja-Dip Cleaning Machine provides a vigorous, many times repeated "shearing" contact of the cleaning solution on all surfaces and *in all recesses* of the work, by raising and lowering the work *in* the solution. When used with the Magnus Cleaner suited to the metal being cleaned, the dirts to be removed and the degree of cleaning required by the finishing operation involved, much faster cleaning at materially reduced costs is obtained. Cleaning results are greatly improved.

This same machine is also used for cleaning automotive and aviation engine blocks and parts, typewriters, business machines, bakery pans, and for many other industrial cleaning operations.

Write for a copy of the Magnus Metal Cleaning Handbook—a complete manual on metal cleaning methods, materials and cleaning machines.

MAGNUS CHEMICAL COMPANY
220 SOUTH AVENUE, GARWOOD, N. J.

MAGNUS Cleaners • Machines

re Arbitration between Merrill-Stephens Dry Dock & Repair Company and Industrial Union of Marine & Shipbuilding Workers of America, Local 32)

A regional war labor board upheld a company's refusal to comply with its maintenance-of-membership contract by discharging upon the union's demand employees who were expelled from the union because of their failure to engage in a strike. The employees, in reality, were the only ones who lived up to the union's constitution, since the strike was unauthorized and in violation of the contract. Moreover, the constitution made provision for penalty of those violating the contract. (Sheffield Steel Corporation, RWLB-VIII)

An arbitrator upheld the company's refusal in the face of a maintenance-of-membership contract to discharge upon the union's insistence employees suspended from the union because of "conduct unbecoming a union member." The suspension had been effected without adequate hearings, and the arbitrator declared the company was acting within its rights "in inquiring into the reason and method of suspension of said employees." (In re Arbitration between John Wood Mfg. Company, Inc., and United Automobile Workers of America, Local 286)

These last two decisions, one by a private arbitrator and the other by a governmental agency, serve to encroach upon unions' autonomy in expelling members from their respective memberships.

* *Compliance Through Pressure*

In non-compliance cases, the WLB will, in the future, resort to publicity with the hope of effecting compliance through pressure of public opinion. It will no longer conduct show-cause hearings, but rather, where directives are violated, will hold hearings to discuss the compliance problem with the party involved. No action will be taken in cases where "recommendations" made by the Board after October 22, 1945, are violated, although these "recommendations" are substitutes for directives.

* *Wage Agreement Invalidated*

On the ground that it is the company's duty to give its union all data and facts bearing on wage negotiations, a RWLB invalidated a wage agreement signed by the union at a time it was not in full possession of the facts. Acting on the employer-supplied schedule of rates being paid at the local unit, the union agreed to rates lower than those being paid on a company-wide basis. Because of the union's lack of information on the company-wide rate schedules, which the company kept in the dark, the RWLB vacated the agreement. (General Motors Corporation, RWLB-XI)

NATIONAL LABOR RELATIONS BOARD

* *Management's Rights*

Reversing its previous decision, the NLRB now holds the anti-union remarks by foremen, the granting of a pay increase in the month of an election, and a letter referring employees to "old timers" who were against

Muscle Mike CAN with this Brawny Midget of Electric Trucks

All industry is using this Miracle Electric Truck. In its motor is a Muscle Mike . . . a brawny midget of electric power that moves up to 6000 pounds with amazing "touch-of-your-thumb" ease.

Its name is Automatic Transporter. You haven't a handling job it can't lick. One man or girl at the control buttons does the work of three husky laborers. That's two-thirds saving in labor alone. Forget about drudgery and fatigue. It's next to nothing. Take it in and out of tight places that would put even hand trucks to shame. It comes through for you without a whimper.

Thousands of these industry-tested Automatic Transporters have been making sensational performance records in every kind of business. Increased production now makes it available to *you*. But for a while the order will have to be "First come, first served!" Mail the coupon so that we can hurry you the complete facts.

BRAWNY MIDGET OF POWER
IT'S ALL IN HERE
AND HERE
ONE DOES THE WORK OF 3!
6000 lbs.
6000 lbs.
WITH 3 TIMES LESS FATIGUE
TO PILE UP ½ TO ⅔ DOLLAR SAVINGS

Remember: ***Only*** **AUTOMATIC** ***makes the*** **TRANSPORTER**

TRANSPORTER

A PRODUCT OF AUTOMATIC

LIGHTENS LIFE'S LOADS

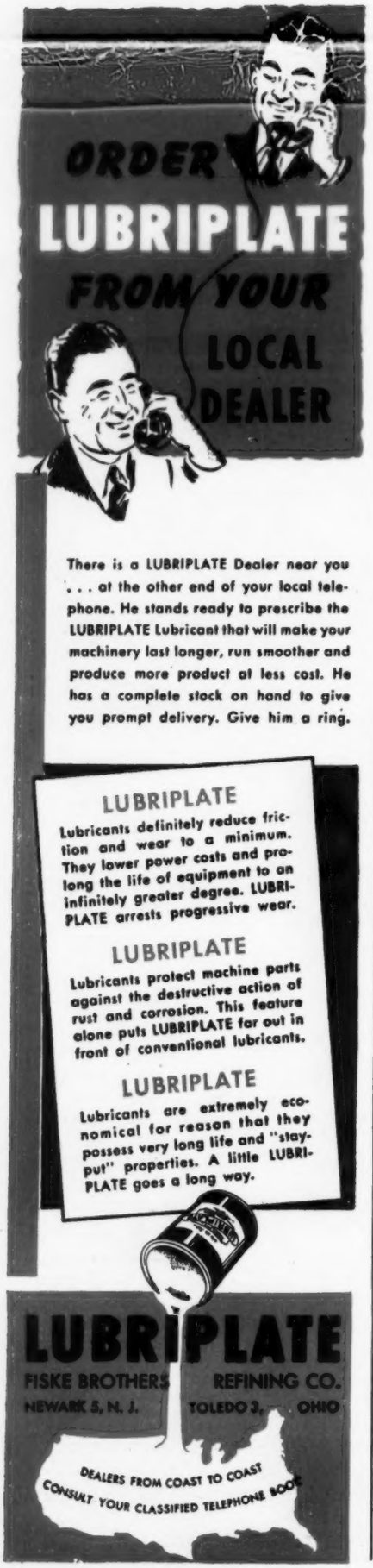
AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale & Towne Mfg. Co., 39 West 87th Street, Chicago 20, Illinois
Please mail me, without cost or obligation, complete facts about AUTOMATIC TRANSPORTER, the Miracle Electric Truck . . . plus *proof* that it will cut my handling costs in half.

Company Name.....

By.....*Position*.....

Street Address.....

City.....*State*.....


ORDER
LUBRIPLATE
FROM YOUR
LOCAL
DEALER
There is a LUBRIPLATE Dealer near you . . . at the other end of your local telephone. He stands ready to prescribe the LUBRIPLATE Lubricant that will make your machinery last longer, run smoother and produce more product at less cost. He has a complete stock on hand to give you prompt delivery. Give him a ring.
LUBRIPLATE
Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.
LUBRIPLATE
Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.
LUBRIPLATE
Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.
LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 5, N. J. TOLEDO 3, OHIO
DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

MACHINERY COSTS MORE THAN OIL OR GREASE

Plant managers dread costly machine replacements not to mention production losses incurred by machine stoppages

Plant managers know that each piece of machinery is only of value to them so long as its bearings, gears, chains and other moving parts withstand the heavier loads and increased speeds imposed by modern industrial demands. Above all, they realized that *proper lubrication* is the chief requisite of efficient and continuous machine operation. It is understandable that they were unwilling to continue to spend dollar after dollar for replacements of scored bearings, chipped gears, and broken chains whose loss could be avoided by proper lubrication from the start.

The increased speeds and heavier loads of modern operation further accentuated the need for better lubrication. So aggravated did the situation become that unless proper lubricants were developed, many of the advantages that improved design and tougher metals imparted to machinery, would be lost. Scientific investigation of the problem by Fiske research engineers brought out two facts. The first was that no one oil or grease would suffice for all industrial applications but a line was required to meet the several conditions. The second was that all lubricants must have in common, greater film strength, better lubricating qualities, and offer protection against rust and corrosion. As the result of this research the LUBRIPLATE line of lubricants was developed.

LUBRIPLATE does reduce friction and wear to a minimum. It is waterproof so prevents rust and corrosion. The "stay put" quality of LUBRIPLATE is exceptional. It offers greater film strength without causing "drag." Unsolicited letters from Plant Managers and Mainetnance Men the country over relate how LUBRIPLATE Lubricants cut replacement costs, reduce machine stoppage, saves on power consumption, and permit heavier bearing loads and increased machine speeds.

In the LUBRIPLATE line there is a sufficient variety of densities and consistencies - - - oil and grease type - - - to satisfy all lubrication needs. LUBRIPLATE distributors the nation over are in a position to make prompt delivery of your LUBRIPLATE requirements. LUBRIPLATE Service Engineers welcome the opportunity to help you with your lubrication problems. A complimentary copy of the "LUBRIPLATE SERVICE HANDBOOK" containing valuable information on the subject of lubrication will be sent you upon request. Write for it today.

ADV.

the union, as practices legally within the company's domain. The remarks of the foremen were in keeping with their right to free expression, since they were eligible to vote in the election; the increase was made in accordance with an established plan for increases; the letter contained no threats of economic reprisal or other coercive features. (Mississippi Valley Structural Steel Company, NLRB)

* *Election Not Set Aside*

Rejecting an employer's petition to set aside the results of an employee election on the grounds that the union engaged in coercive acts, the NLRB points out that such election could be set aside only if employees were precluded from exercising a free choice by conduct which was both coercive in character and so related to the election in time and otherwise as to have an effect on the employees' choice. Neither issuance of an official paper containing a distorted account of the employer's bargaining relations, nor circularization of a letter purportedly from the WLB but containing a false statement regarding wage increases, which occurred in this case, would be sufficient ground for such setting aside. The board deemed the paper merely campaign propaganda and the letter as being discredited, since the employer had instituted a WLB-approved raise before the election. (Maywood Hosiery Mills, Inc., NLRB)

Circularization of a handbill by one or two participating unions on the eve of a representation election, containing the claim that they had secured a wage increase for the employees through the WLB, was deemed not sufficient ground for setting aside the election results. The board found that such news could not have unduly influenced the employees' choice, since a local newspaper carried the item two weeks before election time. (Chicago Mill & Lumber Company, NLRB)

* *Strike Protected by Wagner Act*

Where employees strike to compel an employer to recognize a union at a time when the board is determining whether the striking union or a rival union is the proper bargaining agent, and so cause him to commit an unfair labor practice, the strike does not constitute grounds for denying the strikers the protection accorded by the Wagner Act. Thus, such strikers could not be effectively discharged, nor could they be deprived of the right to vote in an NLRB election, despite the strike, and despite the fact that the employer filled the jobs with replacements who are entitled to vote in the same election. (Columbia Pictures Corporation, NLRB)

* *Reinstatement Ordered*

The fact that employees refuse to handle struck work and engage in lawful assistance of their union is not sufficient ground for discharge. Moreover, stated the NLRB, such workers must be regarded as strikers who strike because of a labor dispute not caused by unfair labor practices, and must be reinstated on application if the jobs are not filled. Thus, the board ordered the reinstatement of three workers so discharged,

COMMON SENSE ASSEMBLY ENGINEERING

ELIMINATES A "SPECIAL" FASTENING ...ADDS EXTRA SAVINGS!

Nor-Jay designed self-locking gas tank caps that met every market requirement. But they ran into troublesome, expensive assembly and decided to question the fastenings... special studs in the plastic cap, machine screws in the metal cap. The problem was up to a P-K Assembly Engineer.

Result – with P-K Screws they eliminate the special studs, add strength, save breakage of plastic caps, permit disassembly and eliminate blind tapping.

It's plain common sense to take a sharp look at fastenings in your product, whether it's in plan stage or production... common sense to start making the P-K savings you've been missing – often from 30% to 50% – by needless tapping, bolting, riveting, inserts in plastic.

A P-K Assembly Engineer will call at your request, or you can mail in assembly details for recommendations. Parker-Kalon Corporation, 208 Varick Street, New York 14, N. Y.

In both metal and plastic caps, three P-K Type "Z" Self-tapping Screws fasten the inside locking parts to the cap body, and another Type "Z" Screw secures the outside dust cap for the lock.

"HOW TO USE" Booklet – FREE. Get acquainted with the many types of P-K Self-tapping Screws and other Fastening Devices – learn how they cut assembly costs, improve products. Ask for Booklet No. 480.

SEE THE P-K EXHIBIT AT
NATIONAL METAL EXPOSITION
CLEVELAND — — FEBRUARY 4-8

PARKER-KALON P-K SELF-TAPPING SCREWS

FOR EVERY METAL AND PLASTIC ASSEMBLY

We hand you every advantage in the sphere of FLUSH FASTENINGS

ALLEN FLAT HEAD CAP SCREWS for perfect countersink-fit; positive wrenching

(1) Flush top surface with no gap between screw head and surrounding metal.

(2) Extreme rigidity of grip, because angle of head helps lock screw in place by drawing down on a conical surface.

(3) Firmer hold on thin plates of metal, by more binding surface under the head than in fillister type or cheese-head screws.

(4) Shallower countersink — less weakening of metal — when used for fastening a relatively thin plate.

(5) Positive engagement of hex key transmits power for tightest of set-ups without slipping, reaming or side play.

(6) Maximum strength of screw itself assured by *"pressur-forming"* of special-analysis ALLENOY steel. Threaded to a high Class 3 fit.

(7) Speed in assembly provided for by use of Allen hand drivers and key blades for power drivers.

Order from your local Allen Distributor.

TRADE A MARK

THE ALLEN MANUFACTURING COMPANY
HARTFORD 1, . . CONNECTICUT, U. S. A.

LABOR DEVELOPMENTS *(continued)*

despite the employer's claim that their jobs were filled. It was found that these workers had been given other work in the past when they were not engaged in their usual duties. (Montgomery Ward & Company, NLRB)

Discharge for the infraction of a no-smoking rule where a large number of other employees were guilty of the same violation was held too severe a penalty. The arbitrator, in deciding the case, pointed out that had the employer posted a notice to the effect that he was aware of the general violation of the rule and would henceforth punish such violation by discharge, the employer's right to discharge in this case would not have been questioned. (In re Arbitration between Douglas Aircraft Company, Inc. and United Automobile, Aircraft & Agricultural Implement Workers of America, Local 201)

* *Reinstatement Denied Economic Striker*

An economic striker may not charge his employer with discrimination for refusing to reinstate him at the termination of the strike when he was "away on business" at the time of reinstatement, and did not return till some weeks later. Although the employer knew of the employee's active union participation, he was not required to keep the job open for the employee, nor remove the replacement upon the employee's return, in the absence of evidence that the employer's action was motivated by a consideration of the employee's union activity. (Goldren Cycle Corporation, NRLB)

* *Reinstatement Not to Be Denied Economic Striker*

An employer may not refuse reinstatement in the case of an economic strike, called in violation of the contract's no-strike clause, where such contract was first breached by the employer, or had been abandoned or terminated by the parties. In the particular case, there was no breach of contract, since the contract had expired approximately 3 months prior to the date the strike was called. Furthermore, the strike was not an illegal one in view of the fact that there was no violence; at best, it involved only "minor misconduct and picket line disorders." (Fairmont Creamery Company, NLRB)

* *Reinstatement Without Back Pay*

Discharge for use of abusive language and threats of violence to the foreman when the latter reprimanded the employee for repeated tardiness, was held to be too severe a penalty. An arbitrator, therefore, ordered the employee's reinstatement but with loss of back pay for a 30-day period. (In re Arbitration between Foote Brothers Car & Machine Corporation and United Electrical, Radio, & Machine Workers of America, Local 1114)

* *Union Activity Time Cut*

Abuse of a contractual clause providing for time off for union business and leave of absence gives the employer, so an arbitrator ruled, the right to limit the amount of time to be so taken off. Where a union official excessively absented himself from his pro-

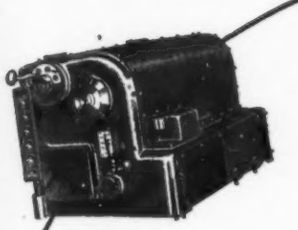
NOW... ONE MACHINE CAN BE BOTH AUTOMATIC AND MANUALLY-CONTROLLED... INHERENTLY

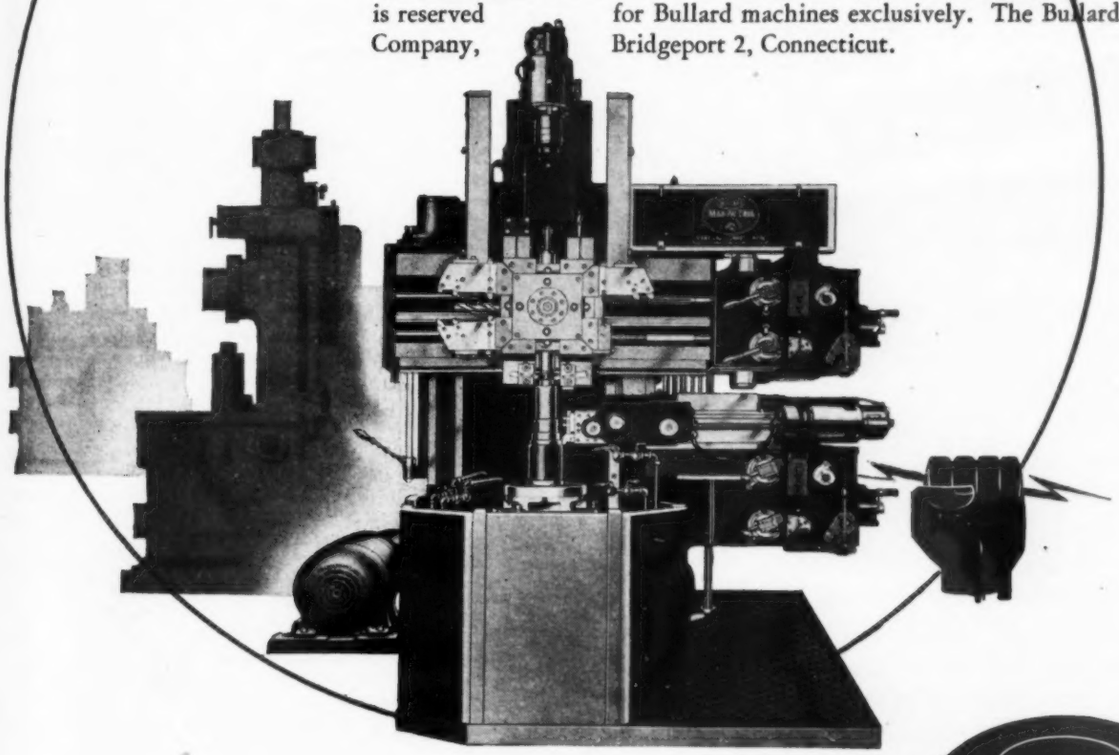
A new production principle gives unheard-of flexibility for diversified shop schedules

The Bullard MAN-AU-TROL principle of automaticity adds to a manually-controlled machine all the advantages of automatic control without sacrificing its versatility. Everything it could do as a manually-controlled machine it can still do . . . *either* under manual or automatic control.

To make that clear, see how a Bullard MAN-AU-TROL Vertical Turret Lathe fits diversified shop schedules. If only a piece or two are required, manual control is specified. On short runs, MAN-AU-TROL can often take over because this automatic feature can be "set-up" for functions and tooling in slightly more time than setting the same job for manual operation. On long runs, it's MAN-AU-TROL without question. Yet, at any time during MAN-AU-TROL operation, the machine can be changed to manual control *instantly* and *temporarily* without affecting the automatic set-up.

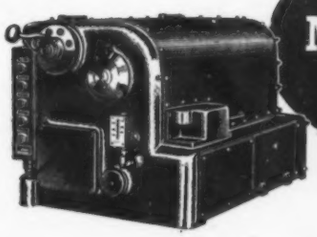
Such revolutionary versatility results from the unique way MAN-AU-TROL merely *substitutes* for the manual operator after he has predetermined the best production method and has set it into an automatic cycle. For the present, MAN-AU-TROL is reserved for Bullard machines exclusively. The Bullard Company, Bridgeport 2, Connecticut.





The automatic control that is as versatile as manual control

BULLARD
MAN-AU-TROL
MASTER OF THE MACHINE



100% automaticity . . . 100% versatility . . . no human or cumulative error . . . control to the closest tolerances . . . a tremendous cost advantage in competitive markets.

NOW!

New Low Rates FOR Air Express

Jan. 1st Cut Saves Shippers 22% Over '43

Send it by Air—Get it by Air

More Economical Than Ever to Ship the Fastest Way

HERE'S HOW LITTLE IT COSTS

AIR MILES	2 lbs.	5 lbs.	25 lbs.	40 lbs.	Over 40 lbs. Cents per lb.
149	$1.00	$1.00	$1.00	$1.23	3.07
349	1.02	1.18	2.30	3.68	9.21
549	1.07	1.42	3.84	6.14	15.35
1049	1.17	1.98	7.68	12.28	30.70
2349	1.45	3.53	17.65	28.24	70.61
Over 2350	1.47	3.68	18.42	29.47	73.68

Another drastic cut in Air Express rates now makes this high speed transportation more important to American business and industry than ever before!
Where, in the whole economy of business, do you get so much for your transportation dollar:

SAME DAY delivery between many airport towns and cities as far as 1,000 miles apart. (Less than 6 hours by air.)

SPECIAL HANDLING. Special pick-up and delivery (no extra cost) promotes speed of Air Express delivery.

GOES EVERYWHERE. In addition to 375 airport communities, Air Express goes by rapid air-rail schedules to 23,000 other important points in this country. Service direct by air to and from scores of foreign countries in planes of American manufacture and reliability giving American service, flying the American Flag!

WRITE TODAY for "Jig Saw Puzzle." It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17. Or ask for it at any Airline or Express office.

AIR EXPRESS

AIR EXPRESS

GETS THERE FIRST

Phone AIR EXPRESS DIVISION, RAILWAY EXPRESS AGENCY
Representing the AIRLINES of the United States

duction job to take care of union affairs, refused to take a leave of absence at the company's suggestion, and ignored the company's rule that he ask for time off before leaving the plant premises on company time, the arbitrator gave the company the right to prescribe conditions under which such future time should be allowed. The arbitrator did declare, however, that discharge of the union official for the above reasons was too severe a penalty. (In re Arbitration between Brown & Sharpe Manufacturing Company and International Association of Machinists, AFL)

* *Contract No Bar to Strike Vote*

The existence of a contractual clause containing a no-strike provision will not serve to waive the union's right to strike vote when requested. Although the strike vote is tantamount to a breach in the collective bargaining agreement, the NLRB declared that it could not deny this right, since the Smith-Connally Act makes such action mandatory on the board upon the union's notification to strike. (Republic Steel Company, NLRB)

However, a federal district court did enjoin the board from holding a strike vote in another case where there was no dispute between the company and any of its employees, and the application for a strike vote was made by an individual, not an employee of the company, who had a dispute with another employer and wished to prevent the latter from handling the former's products. (Interstate Trinity Warehouse, USDC N. Texas)

* *Discharge Unjustified*

Expulsion from the contracting union because of his activities for a rival union in an employee election does not provide the employer with sufficient ground for discharge, although the employer acts in good faith in complying with the union contract. Where the union demands the discharge of such employee, the employer is obligated legally to refuse to comply with the closed-shop provisions of his contract. The board thus found the employer guilty of an unfair labor practice. (Portland Lumber Mills, NLRB)

* *Coercion Prohibited*

Management's right to free speech does not encompass the right to warn its employees that unionization of the plant will mean the closing of the plant and the subsequent loss of economic security on the part of the employees. This rule canon was announced in a recent case, despite the fact that the employer genuinely believed that unionization would cause the loss of his best customer and the shutdown of his plant, and informed employees that he himself had no objection to unionization among the employees. The NLRB found the employer guilty of coercion, although it did recognize the employer's *bona fide* intentions. (N. J. Showalter Company, NLRB)

Held Not Interference

The fact that a supervisor closely observed employees' union activities during working hours was held not to be an act

LEWIS-SHEPARD

Power Fork Trucks

MULTIPLY MANPOWER · LEWIS-SHEPARD · TRADE MARK

★ **PIVOT on a PLATTER**
Easy Maneuvering in Narrow Aisles

★ **HUG the GROUND**
Heavy, One-piece Chassis Frame Gives Lowest Center of Gravity

STOP breaking man-backs and losing manhours. Multiply Manpower with L-S Power Fork Trucks.

STOP wasting your stratosphere! Store more, pile higher, do it faster and safer with L-S Power Fork Trucks.

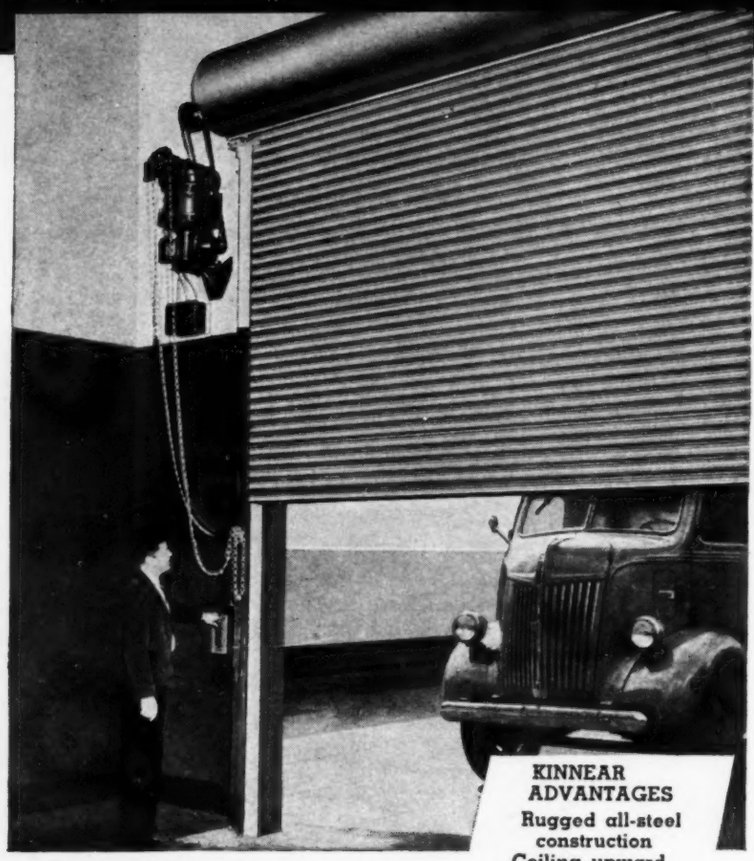
GO all out! Haul more for less money . . . on wheels! Use L-S Power Fork Trucks.

GO ahead full speed! Put your business on motorized wheels and cut costs with L-S Power Fork Trucks. . . . Electric, Gas and Gas-Electric Power . . . Capacities: 4000 lb., 3000 lb. and 2000 lb. Let the L-S catalog show you how!

LEWIS-SHEPARD PRODUCTS INC.
314 WALNUT ST., WATERTOWN 72, MASS.
Representatives in Principal Cities Consult Phone Directory

SINGLELIFTS HYDRAULIC HANDLIFT TRUCKS JACKLIFTS
SKIDS PALLETS PALLET TRUCKS PALLET STACKERS
PRODUCTION LIFTERS CRANES RACKS FLOOR TRUCKS
ELECTRIC, GAS-ELECTRIC AND GASOLINE POWERED FORK TRUCKS

Opening for Efficiency!

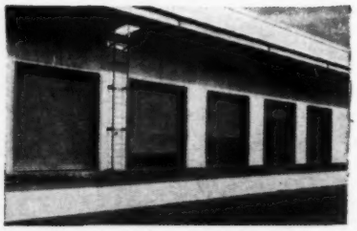


KINNEAR ADVANTAGES

Rugged all-steel construction
Coiling upward action
Effective counterbalance
Flexible interlocking steel-slat construction
Motor operation, with remote control if desired
Individually engineered for each opening
Many others

KINNEAR . . .
STEEL ROLLING DOORS

Every doorway gives you an "opening" for more efficient traffic and materials-handling, shipping or warehousing. Just install sturdy, dependable KINNEAR Steel Rolling Doors. They feature an all-metal door curtain of rugged, flexible, interlocking slats. The curtain coils upward into a small roll, clearing the opening completely, saving wall and floor space, and remaining out of reach of damage when open. KINNEAR Motor Operators may be had if desired . . . offering additional advantages of quick, labor-saving, push button control.



The KINNEAR Manufacturing Company

Saving ways in Doorways

1540-60 Fields Avenue
Columbus 16, Ohio
1742 Yosemite Avenue, San Francisco 24, Calif.

Offices and Agents in All Principal Cities

KINNEAR ROLLING DOORS

LABOR DEVELOPMENTS *(continued)*

of interference on the part of the employer, where there was no past history of anti-union conduct on the management's part, and the supervisor did not so act as to discourage self-organization among the employees. The board declared that such supervision was incidental to the duties of the supervisor. (Mt. Vernon Woodberry Mills, Inc., NLRB)

Nor does one supervisor's anti-union remarks to another supervisor constitute interference. In the second case, the board deemed the employer fully within his rights in asking one supervisor to inform another of the company's desire to discourage union membership among its supervisory staff. (U. S. Cartridge Company, NLRB)

Union Not Liable Under Anti-Trust Laws

The fact that a labor union combines with an employer association to prohibit night work in a non-member's plant does not constitute a violation of the anti-trust laws. The union forbade the employees it represented to do commercial night work for a non-member newspaper shipping part of its work out of state, and refused to negotiate terms under which the work could be done. Although this combination was an act of interference with interstate commerce, the court declared that the anti-trust laws were inapplicable, since it could not be proved that an attempt was made to raise or fix prices or to prejudice customers. (Philadelphia Record Company vs. Manufacturing Photo-Engravers Assn. of Philadelphia et al., USDC E. Pa.)

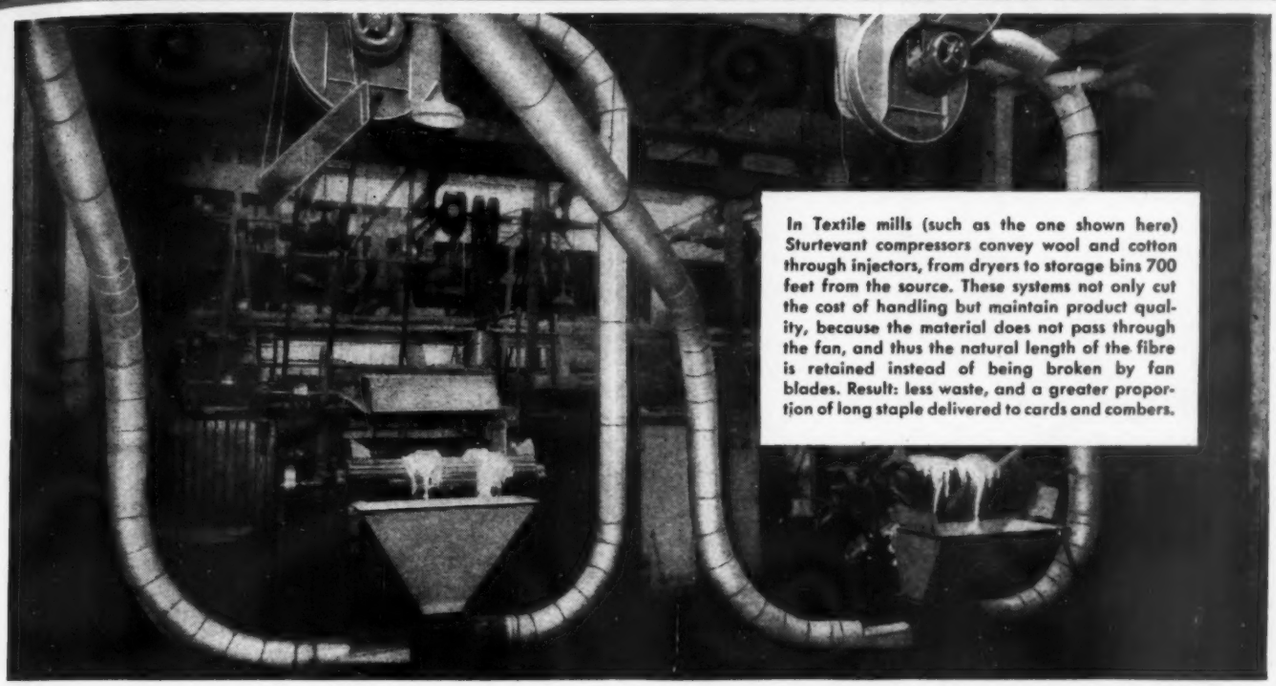
* *Sum Not Deductible From Back-Pay Award*

Amounts that discriminatorily discharged employees could have earned at lower paying jobs offered by the discharging employer are not proper items to be deducted from the amount payable under a NLRB's back-pay award. In this case, the employer had told employees that if they joined the union, they would be transferred to lower paying production jobs. The employees, not supervisors, joined the union and left the plant rather than accept the demotion. The board deemed the demotion discriminatory. (NLRB vs. Armour & Company, CCA-10)

* *Back Pay Ordered*

Although the arbitrator upheld the employer's right to discharge two employees for refusal to perform assigned work (insubordination), he awarded the employees involved back pay from the date of dismissal to the date of the award, because the employer did not comply with the discharge procedure set forth in the collective bargaining agreement. The latter provided for an opportunity for the employees to be heard before discharge, and after discharge for a hearing to which the superintendent and foreman of the employees were to be called. (In re Arbitration between the Torrington Company, Bantam Bearings Division and United Automobile, Aircraft, & Agricultural Implement Workers of America, Local 590)

that makes AIR pay you a profit



In Textile mills (such as the one shown here) Sturtevant compressors convey wool and cotton through injectors, from dryers to storage bins 700 feet from the source. These systems not only cut the cost of handling but maintain product quality, because the material does not pass through the fan, and thus the natural length of the fibre is retained instead of being broken by fan blades. Result: less waste, and a greater proportion of long staple delivered to cards and combers.

In conveying, drying, fume control and dozens of other applications, the Sturtevant Centrifugal Compressor is helping many industries to speed up production and to turn out a better finished product. Engineered to give quiet, vibrationless operation, the Design 9 Compressor delivers constant pressure over a wide range of volumes, requires no maintenance other than occasional lubrication, and yields important savings on power. For complete details, write for Catalog No. 386-2.

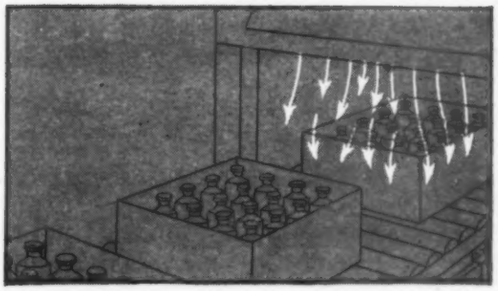
B. F. STURTEVANT COMPANY

Division of Westinghouse Electric

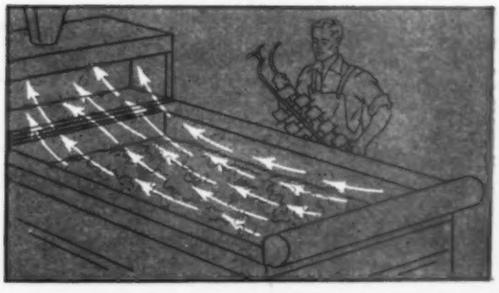
HYDE PARK, BOSTON 36 MASS.

Sturtevant

Puts Air to Work



High velocity air jets perform the dual function of blowing off excess moisture and drying the metal containers shown above. The drying load is greatly reduced since surface moisture is eliminated mechanically rather than by the application of heat. Such systems are suitable for any continuous production line.



On large plating tanks where it is not practicable to install overhead hoods for fume control, this ingenious "push pull" air system has been developed. A thin screen of high pressure air is directed across the surface of the tank, pushing the fumes into an exhaust duct on the opposite side. This method prevents fumes or vapors from rising into the working area and calls for a greatly reduced flow of exhaust air, with consequent savings in piping expense, power consumption and heat loss.

Whatever the type of Jack Simplex is Safest!

Simplex industrial jacks are not only the safest jacks made, but they form the most complete line offered industry, embodying as they do lever, screw and hydraulic jacks up to 100 tons capacity. Our statement that Simplex Jacks are the safest will stand the closest investigation. Exclusive safety features found in every Simplex Jack include critical parts of carefully selected materials, tough, close-grained forgings, careful heat treatment and proved design that eliminates structural weaknesses. Every Simplex Jack is tested to 50% overload before shipping, and is guaranteed to lift and hold its full rated capacity. Speedy operation combined with safety makes Simplex Jacks your logical choice.

Write for complete pocket-sized catalog.

Templeton, Kenly & Co.
Chicago 44, Ill.

SIMPLEX
WORLD'S MOST COMPLETE LINE OF
JACKS
LEVER
SCREW
HYDRAULIC

THEY SAY AND DO

Management's Program for Labor Relations

An expression of the combined views of the 36 delegates and alternates who were designated as management representatives at the National Labor-Management Conference.

General Recommendations

1. Collective bargaining on wages, hours, and working conditions should be a process by which an employer and the freely chosen representatives of workers negotiate in the interest of effecting a transaction mutually advantageous to the employer, employees, and to the public served by the enterprise of which they are a part.

2. Genuine collective bargaining on wages, hours, and working conditions involves a determination to resolve disputes and conclude an agreement with such terminal or renewal provisions as may be defined on matters under consideration, when approached with a fair and open mind, in a conscientious endeavor to understand each other's problems and in the interest of stabilizing employment relations.

3. Collective bargaining on wages, hours, and working conditions is required by law. It is approved by the public. It is and must be accepted by employers, employees, and their representatives in every instance where workers choose to organize to bargain collectively on questions of wages, hours and working conditions.

4. The parties to the practice of collective bargaining as herein defined may find it desirable, as collective bargaining relationships are established on a satisfactory basis, to engage jointly by mutual consent in other activities which they may regard as mutually advantageous and desirable and not contrary to the public interest.

5. Initial presentation of demands is the first step in the collective bargaining process. When either party makes extravagant demands on the other the process of full and genuine collective bargaining may be impeded.

6. Full and genuine collective bargaining may result in disagreement. Sincere bargaining cannot be regarded as requiring that demands must be, in full or in part, accepted or compromised if either party acting in good faith concludes that acceptance or compromise would be improper or prejudicial to the interest of the employer, employees, the union, or the public.

7. The object of collective bargaining is voluntary agreement. Temperateness of approach will aid in the attainment of this objective.

8. There is a duty on the parties to bargain sincerely in good faith and to discuss freely and fully their respective claims, demands, and refusals.

9. Good faith means regard for relevant facts and intent that agreement reached shall be observed.

10. The voluntary and just settlement of collective bargaining issues in dispute is impossible under conditions of force regardless of its source or nature. Voluntary negotiations or free collective bargaining is not possible except under conditions of law and order and the absence of force. Management and labor are but a part of the general public. The public has the right to insist that management and labor at all times practice collective bargaining with full regard for protection of individuals and property against unlawful acts.

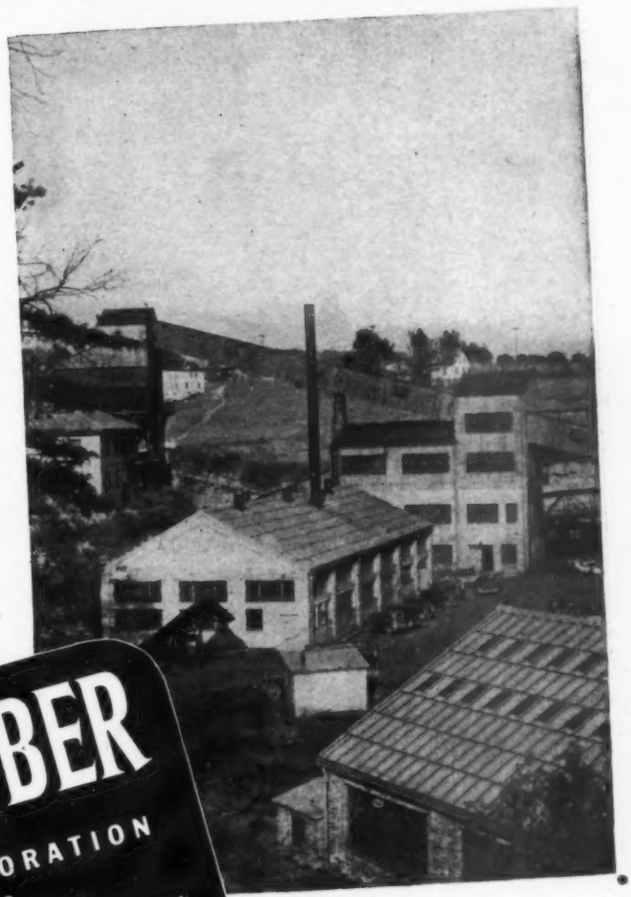
11. Industrial disputes can be minimized by full and genuine acceptance by both parties of collective bargaining as above described in every instance where workers freely choose to organize to bargain collectively on questions of wages, hours, and working conditions.

12. Collective bargaining agreements should be reduced to writing and signed by the parties. The agreements constitute the terms and conditions which govern the wages, hours, and working conditions of employees included in the appropriate unit, and which must be observed by the management forces and employees and their representatives, for the period of the contract and extensions thereof.

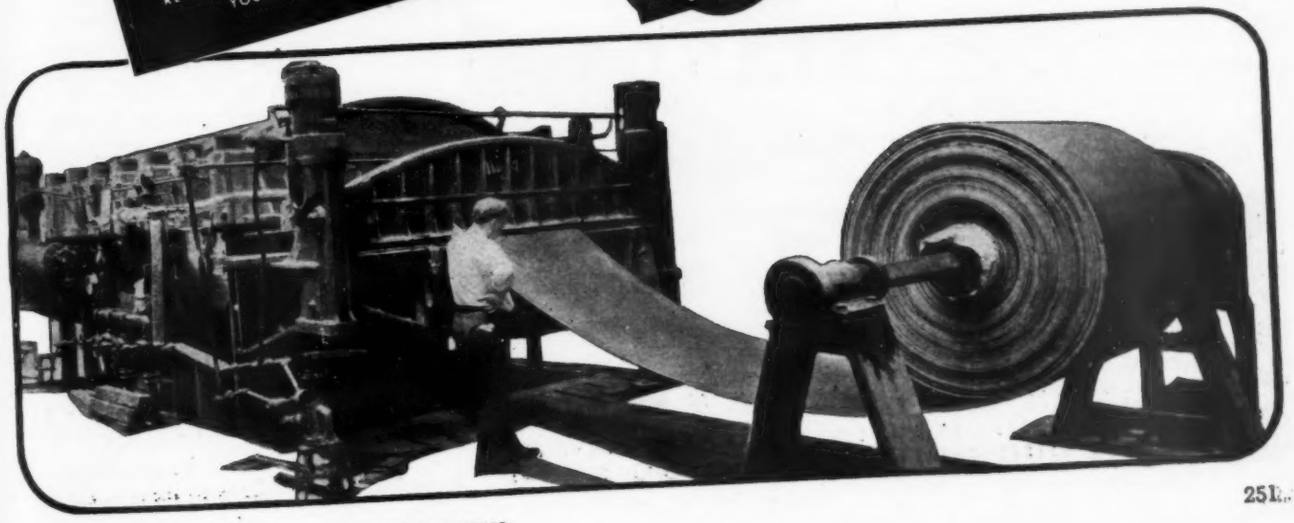
13. A profound understanding of mutual rights and obligations of both parties under the agreement is essential to the successful administration of a collective bargaining agreement. It is the responsibility of labor unions and employers to educate their members and representatives as to the terms and conditions of the agreement and the respective rights and duties of the parties under the agreement. Appropriate methods should be employed to assure that the full content of agreements be made

BUILDING CONVEYOR BELTING TAKES BOTH *Know-How* AND *Follow-Through*

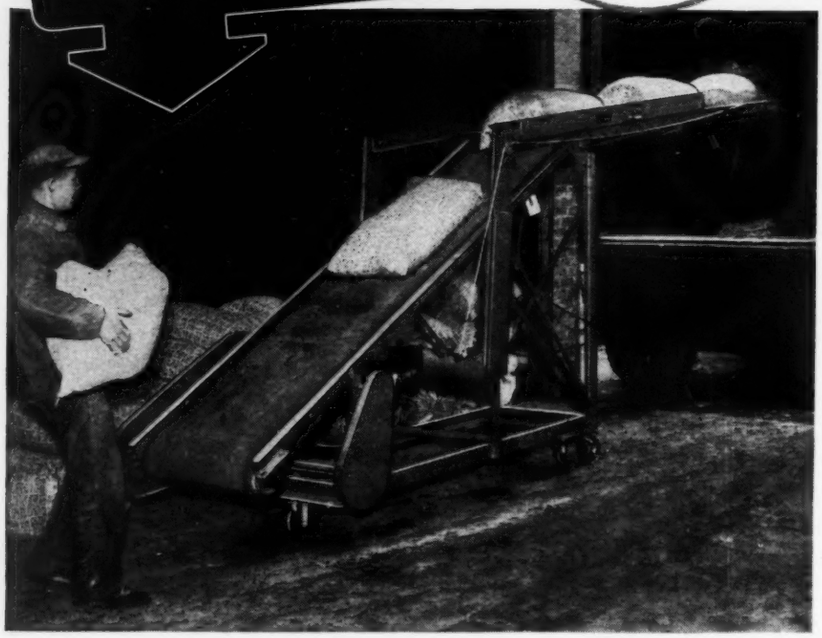
THE BUILDING of a Republic conveyor belt is a specialized job, calling for skill, workmanship and experience. Each belt is virtually "tailor-made." While rubber, reinforcing components and construction details are specified previously by Republic technologists, according to service requirements, the actual belt-building has its variations, too, and is equally important. On the expertness of belt-builders depends the "follow-through"—the proper alignment of fabrics so the belt will run true, the care in location of seams, the sealing-in of the reinforcing carcass for protection against moisture, and other on-the-spot factors of construction. For whatever purpose a Republic Conveyor Belt is built, you may be sure of this "tailor-made" value. Consult the nearby Republic Distributor on your next installation.



REPUBLIC RUBBER
DIVISION
LEE RUBBER & TIRE CORPORATION
YOUNGSTOWN 1, OHIO
REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN, O.
LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN, PA.
WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION



LOAD OR UNLOAD TRUCKS AND CARS
Easier-Faster-
at Low Cost



with the HANDIPILER

THE HANDIPILER loads, unloads, elevates, stacks, handles cartons, cases, bags, other packages. Compact, lightweight, safe, easy to operate, flexible, it is easily wheeled into crowded corners, around the shipping platform—fine for truck loading. Adjustable boom is clear of supporting obstructions; easily extended over piles or into car or truck. Floor locks hold machine in position. Reversible carrying apron. Available in four sizes, high end adjustable up to 7½, 8½, 9½, and 10½ feet; stacks commodities as high as 12, 13, or 14 feet. Handles individual items up to 100 lbs. Motor mechanism in base frame—plug into any convenient outlet. Write for Bulletin No. FM-16

STANDARD CONVEYOR CO.
General Offices: North St. Paul 9, Minn.
Sales and Service in Principal Cities

ROLLER · BELT · SLAT · PUSHBAR CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

known or available to the members of the union and employer group.

14. It is of fundamental importance that contract commitments made, be observed without qualification by employers, employees, and labor organizations. Both parties to the agreement must impress upon their associates and members and officers the need for careful observance of both the letter and the spirit of collective bargaining agreements. Employers, employees, and unions should not provoke one another into any action violating the agreement.

15. In order to provide effective measures to carry out the letter and spirit of the labor agreement, it is recommended that each agreement or contract provide for appropriate guarantees to insure complete and effective compliance with provisions of the agreement prohibiting strikes, lockouts, or boycotts.

16. For years, in the public interest, legislation and governmental regulations have controlled the activities and defined the responsibilities of employers. Likewise in the public interest, the activities of labor organizations should be controlled and their responsibilities appropriately defined to assure equality of status before the law. Equity requires that both parties to a labor agreement be equally answerable as entities in judicial proceedings for conduct in violation of contracts or legal requirements.

17. The customary provisions incorporated in collective bargaining agreements which permit management to discipline any employees subject to their right to appeal through the grievance machinery of the agreement for any violation of its provisions are desirable and necessary for the proper administration of the agreement.

18. Management and unions must require that their respective officials refrain from encouraging or engaging in contract violation. The parties must establish and enforce such regulations as may be necessary within their respective jurisdictions to insure absolute unqualified adherence to the contract commitment made.

Functions and Responsibilities of Management

1. The National Labor Relations Act requires collective bargaining "in respect to rates of pay, wages, hours of employment, or other conditions of employment," where "employees" have elected to bargain collectively. It is, therefore, an obligation of management to adhere strictly to these provisions.

2. It likewise should be an obligation on the part of unions to recognize, and

BULLDOG BUSTRIBUTION DUCT FOR "PLUG-IN" POWER . . . ANY TIME : : : AT ANY POINT

Conversion goes on ALL THE TIME in industrial plants—not just during or after a war.

Production lines must constantly be re-arranged to meet new or altered manufacturing schedules. Machines may work in many different locations during their service lifetime.

With old-type *fixed* outlet systems, re-wiring to accommodate these changes is slow and costly. Not with BullDog BUStribution Duct—the original "plug-in" system gives you electrical power *whenever* and *wherever* you need it.

This system—result of half a century of leadership in the electrical distribution field—gives you the finest *flexible* set-up for all your power needs. It's *plus* in everything but price—100% salvable, too.

Investigate BUStribution Duct for *your* plant. Consult BullDog field engineers or write us direct.

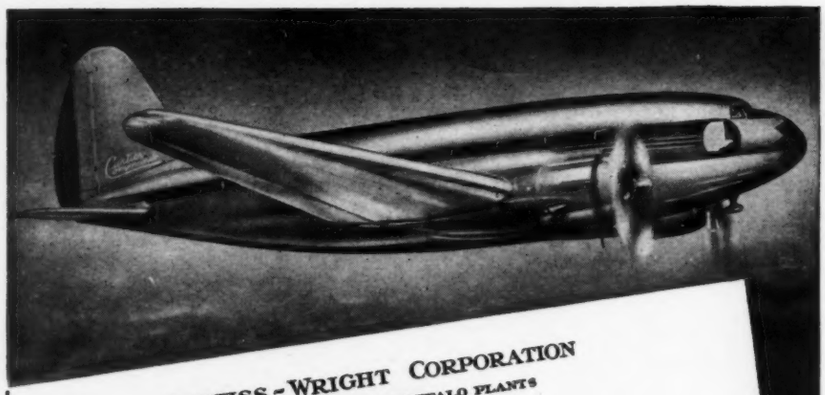
BUY VICTORY BONDS

SALVAGE PAPER

DETROIT 32, MICHIGAN.
In Canada:
BullDog Electric Products of Canada, Ltd., Toronto.
Field Offices in All Principal Cities.

BULLDOG
ELECTRIC PRODUCTS COMPANY

Also Manufacturers of
Vacu-Break Safety Switches — SafToFuse Panelboards—Switchboards—Circuit Master Breakers — Industrial Trol-E-Duct for moving "loads"—Universal Trol-E-Duct for completely flexible lighting.



CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION-BUFFALO PLANTS
BUFFALO, N.Y.

September 12, 1945

Buell Engineering Co., Inc.
70 Pine Street
New York 5, New York

Gentlemen:

It is a pleasure to answer the recent inquiry from your Engineering Department checking upon the mechanical operation of the Buell Dust Recovery Systems installed in our three plants.

Buell Fly Ash Collectors have been in service on twelve (12) boilers since 1941, operating continuously.

Since the time of their installation, they have cost us nothing for maintenance or repair. Their collection efficiency has fully met our requirements, and they have accomplished in a highly satisfactory manner the job for which they were installed.

Yours very truly

Guy Maher

Guy Maher, Plant Engineer
CURTISS-WRIGHT CORPORATION
Plant #2

• BUELL DUST RECOVERY SYSTEMS are used throughout industry in the collection or reclamation of many kinds of dust, in numerous production and process operations. Hundreds of satisfied industrial users will attest to Buell's—"High Efficiency, Low Maintenance, Long Life."

buell
DUST RECOVERY SYSTEMS

Write for Buell's new, revised book "The Buell {van Tongeren} System of Industrial Dust Recovery" now in its fourth printing.

BUELL ENGINEERING COMPANY, INC.
12 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

not encroach upon, the functions and responsibilities of management. Failure to accept this obligation has increased labor disputes. Even today, efforts are continuing on the part of certain unions to extend the scope of collective bargaining to include matters and functions which are clearly the responsibility of management. The functions of management must be preserved if American business is to continue progressive and efficient, create more good jobs and further raise the general standard of living. Management must always exercise its functions with due regard to its social responsibility.

3. For the purpose of avoiding misunderstandings and minimizing industrial disputes, management has classified some of the important functions of management involved in operating a business. They have been placed in two classifications:

Those matters which are clearly the functions and responsibility of management and are not subject to collective bargaining;

The second comprises matters in respect to which it is the function and responsibility of management to make prompt initial decisions in order to insure the effective operation of the enterprise, but where the consequences of such actions or decisions are properly subject to review when they involve issues of alleged discrimination, affect wages, hours, working conditions, or agreed-upon management-labor practices. Such matters should be handled promptly under grievance procedures mutually agreed to as being appropriate for each specific item.

4. Illustrative of items which we believe belong in the first classification and which are not subject to collective bargaining are:

The determination of products to be manufactured or services to be rendered to customers by the enterprise; and the location of the business, including the establishment of new units and the relocation or closing of old units. (When it becomes necessary to relocate a unit or close an old unit or transfer major operations between plants, management should give careful consideration to the impact of such moves on the employees involved, and discuss with them or their accredited representatives possible solutions for the resulting problems.)

The determination of the layout and equipment to be used in the business; the processes, techniques, methods, and means of manufacture and distribution; the materials to be used (subject to proper health and safety measures where dangerous materials are utilized), and the size and character of inventories.

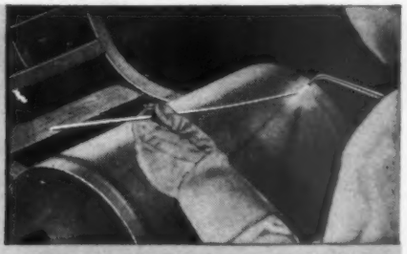
The determination of financial policies; general accounting procedures—particularly the internal accounting necessary to make reports to the owners of the business and to government bodies requiring financial reports; prices for goods sold or services rendered to customers; and customer relations.

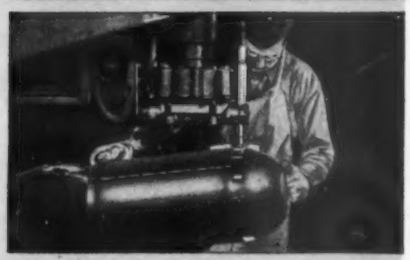
The determination of the management

Production leaders are

joining magnesium

for new results by standard methods





Every day, in modern plants, they're speeding new lightweight products . . . making important economies, too . . . by getting the most out of magnesium's advantages in fabrication and manufacturing.

There's easy joining—by all common methods—for example. Like up-to-date production men everywhere, you need only follow the established procedures for joining magnesium by riveting and gas, arc, spot, and flash welding. Riveting is the method most commonly used, with procedures similar to those used with other metals. Welding techniques are likewise simple and well-defined.

For many years Dow has taken a leading part in the development of standard procedures for handling magnesium. For detailed engineering data, call your nearest Dow office.

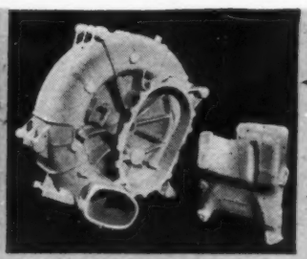
Ready . . . to make products move!

MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS

Full stocks of magnesium in all common forms are now available from Dow, the pioneer producer and today's leading fabricator.

Die casting is one of the numerous magnesium production methods. Dow engineers cooperate with many independent die casters.



Many magnesium sand castings, too, are serving to reduce weight in new products in both consumer and industrial classifications.

MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

The versatility of Continental wire is apparent when you look at the illustrations above. There is not only a big difference in the size of the wire in the match book and the pin in the door hinge, but there is a big difference in the temper, analysis, and finish. Continental wire for each of these applications is made especially to meet the individual requirements.

Continental specializes in producing wire in a vast variety of shapes, tempers, analyses, and coatings to fit the particular specifications of hundreds of products. You are invited to take advantage of this service. Write or wire today for complete information.

CONTINENTAL SUPERIOR STEEL

CONTINENTAL
STEEL CORPORATION
GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF: MANUFACTURER'S WIRE: Bright, Annealed, Galvanized, Copperized, Tinned, Liquor Finished, Lead Coated, Special wire, etc. Also Chain Link Fence, Nails, etc. STEEL SHEETS: Black, Galvanized, Hot Rolled Annealed, Hot Rolled Pickled, Long Terne, Copperized, Lead-Sealed, Galvannealed, Super-Steel, etc.

THE SUPERIOR SHEET STEEL COMPANY, DIVISION • CANTON, OHIO

organization of each producing or distributing unit; and the selection of employees for promotion to supervisory and other managerial positions.

The determination of job content (this refers to establishing the duties required in the performance of any given job and not to wages); the determination of the size of the work force; the allocation and assignment of work to workers; determination of policies affecting the selection of employees; establishment of quality standards and judgment of workmanship required; and the maintenance of discipline and control and use of the plant property, the scheduling of operations, and the number of shifts.

The determination of safety, health, and property protection measures, where legal responsibility of the employer is involved.

5. The second classification comprises matters in respect to which it is the function and responsibility of management to make prompt initial decisions in order to insure the effective operation of the enterprise, but where the consequences of such actions or decisions are properly subject to review by grievance procedures mutually agreed to as being appropriate for each specific item. Among items illustrative of this classification are:

Discharge of employees for cause; the application of seniority provisions of contracts; penalties imposed as the result of disciplinary action; and such other matters as may be mutually agreed upon.

6. Management recognizes that the items listed in each of these classifications above do not include all of the subjects that may arise in connection with the negotiation or administration of any given collective bargaining contract. We believe, however, that genuine acceptance on labor's part of the above classification of these items would do much to define with reasonable accuracy an area of responsibility which must be left to management, if management is to function effectively in the interest of labor, the investor, and the consuming public.

7. Management recognizes that various crafts, such as the building and printing trades, among others, have established practices over a long period of years which permit inclusion of foremen in collective bargaining units in accordance with union constitutions, and the following recommendations are not designed to alter such long-standing practices.

8. However, in any report on management functions, the term "management" must be defined to include all levels of managerial and supervisory personnel and not confined to top ranking executive and administrative officials. Executive management cannot properly function and discharge its responsibili-

ADDING THE FINAL TOUCH TO MOBILITY

This employee has both hands free to handle stock, while the parts truck, mounted on Bassick Casters, is held motionless by Bassick Position Locks. (Photo courtesy of Pan American Airways System).

To portable equipment rolling swiftly and easily on Bassick Casters, Bassick Position Locks add the final touch of complete control. Heavy machines, floor trucks, dollies, work stands, products on assembly line and other caster-borne units are "anchored" in position wherever required — safely and positively.

Slight downward pressure on the foot lever puts the friction-shoe in contact with the floor. A wide friction contact — almost 12 square inches — is held securely in place by spring pressure until released by an upward touch of the toe underneath the lever.

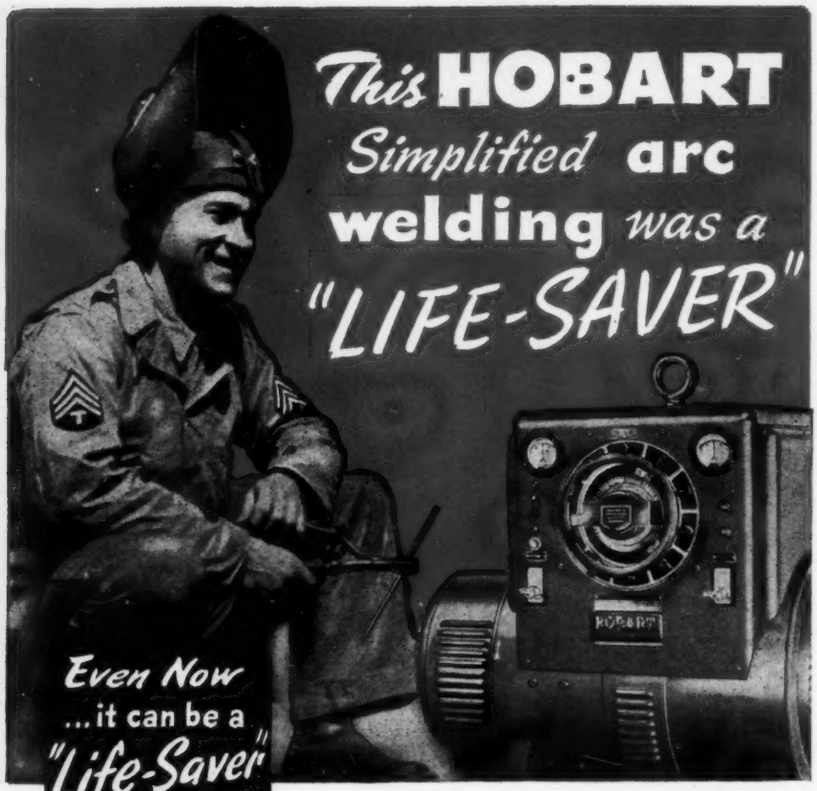
Bassick Position Locks are made in sizes and heights to fit most portable equipment, including that running on angle floor tracks. Like casters, they are easily attachable by a flat top mounting plate to the under side of equipment — out of the way yet readily accessible.

By bringing greater safety and positive, instant control, these Position Locks widen the scope of caster-conveying. In this they are typical of the many outstanding Bassick developments now helping to cut time and costs in countless applications throughout industry. To *you*, Bassick-engineered production aids offer the same important advantages for more efficient, more economical handling of materials . . . Why not investigate them fully? Write to THE BASSICK COMPANY, Bridgeport 2, Conn. Division of Stewart-Warner Corporation. Canadian Div.: Stewart-Warner-Alemite Corp., Ltd., Belleville, Ont.

Casters now more useful
With an easy stop or go,
Provided by position locks
With a simple touch of toe!

Making more kinds of Casters... Making Casters do more

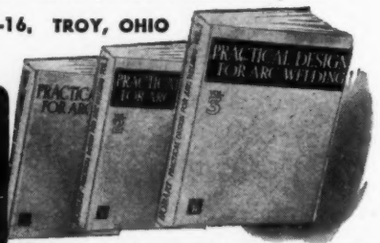
Bassick



Returning Army Veterans keep telling us how Hobart "Simplified" Arc Welding was a real "life-saver" in making emergency construction and repair welds under trying conditions. And under such hazards, the Hobart Arc Welders kept on producing good, substantial welds that enabled Army mobile equipment to "keep rolling." Now that they've changed to civilian clothes, their choice is still HOBART! Hobart can be a "life-saver" for you, too, because Hobart will give you better welds; speed up production; give you more years of useful operation. Use coupon for details.

Illustrated are 3 volumes of "Practical Design for Arc Welding." They fill a definite need for engineers, designers—and all men who are interested in arc welding design in terms of increased profit. Each $3.50, or all three $10.00. Send coupon.

HOBART BROTHERS CO., BOX FM-16, TROY, OHIO



HOBART
One of the World's Largest Builders of arc welders

Reach for Your Scissors!

HOBART BROTHERS COMPANY **Box FM-16, Troy, Ohio**

I'm interested in Hobart Arc Welding and what it can do for me—

☐ Send details on Hobart Arc Welders.

☐ Send_____copies of "Practical Design for Arc Welding." $_____enclosed.

We contemplate using welding for_____

Name _____

Firm _____

Address _____

ties without adequate assistance. It is therefore fundamental that there be no unionization of any part of management.

9. As a practical matter, supervisors organized for collective bargaining purposes would of necessity be faced with the problem of whether a particular decision or action would be serving the objectives of the union or carrying out the policies of management. The supervisors cannot properly function in a position of dual obligation.

10. To the foreman is delegated the ultimate responsibility of directing the workmen at the point where they are actually engaged in production. Since the foreman exercises managerial authority, he must be solely and exclusively responsible to higher management.

11. Furthermore, under collective bargaining agreements, the foreman usually makes the first management disposition of all grievances. With union foremen having supervision of union workmen, the foremen could not receive and act on grievances for the management, since it would mean the unions had taken over both sides of the bargaining table.

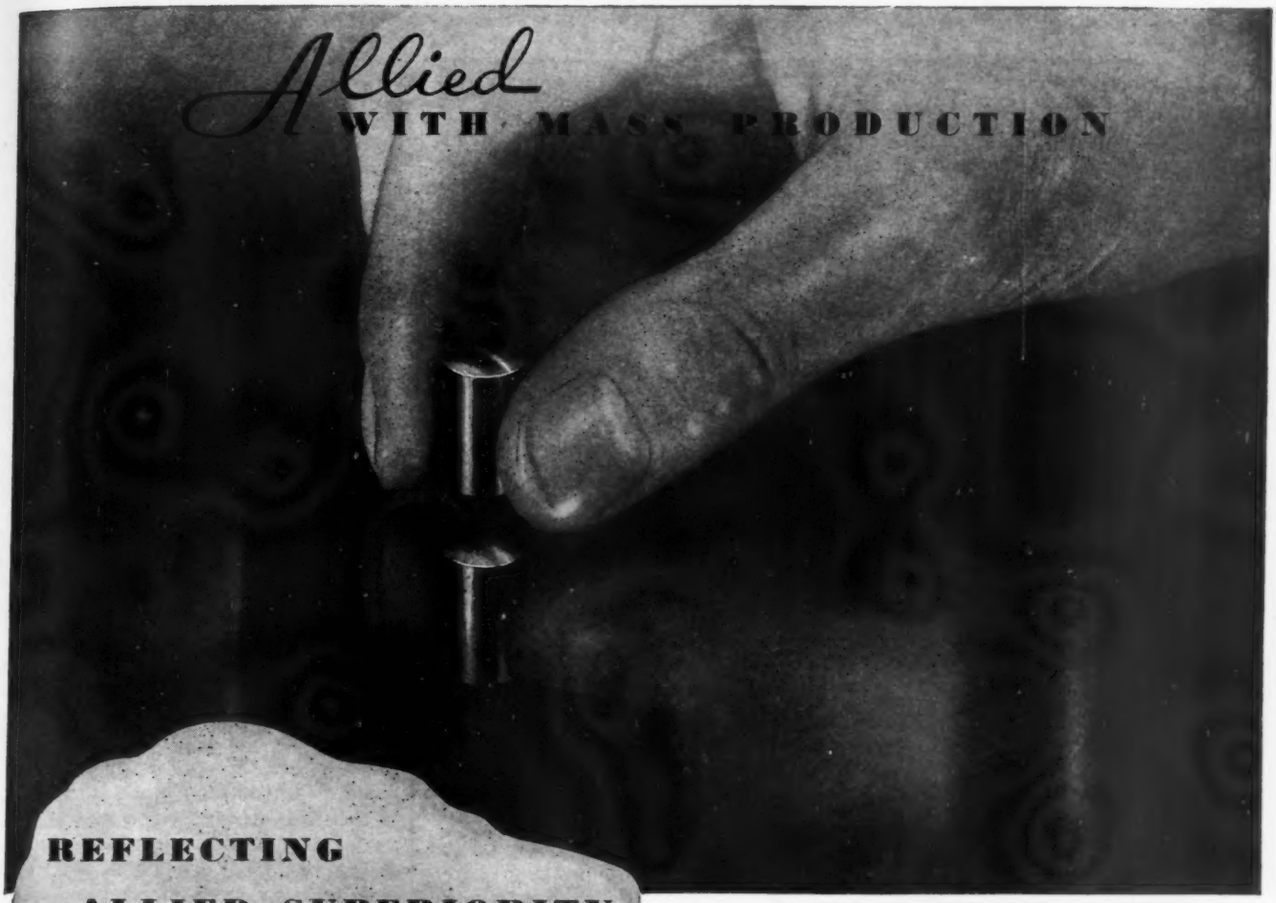
12. In requiring that employers bargain with foremen's unions whose members are the direct representatives and an integral part of management, either the National Labor Relations Board is misinterpreting the Wagner Act, or the act itself is inconsistent and contradictory.

13. Management therefore urgently recommends that the term "employee" in the Wagner Act should be clearly defined, either by the National Labor Relations Board or by Congress, to exclude all persons holding full-time managerial and supervisory positions.

Determination of Collective Bargaining Representatives

1. Whenever a question arises as to which, if any, representative has been selected by a majority of employees in an appropriate bargaining unit for purposes of collecitve bargaining, every effort should be made by the employer and the representative or representatives involved to reach a voluntary non-collusive determination of the question, consistent with the principles established by the National Labor Relations Act.

2. In the event that efforts at such voluntary determination are unsuccessful, prompt resort should be made to state or federal agencies empowered to determine (1) whether a majority of



REFLECTING
ALLIED SUPERIORITY

IN HARDENED AND PRECISION GROUND PARTS

THIS valve tappet roller pin is perhaps one of the simplest-appearing parts produced at Allied Products, yet it typifies the production skill and ingenuity of the entire Allied organization.

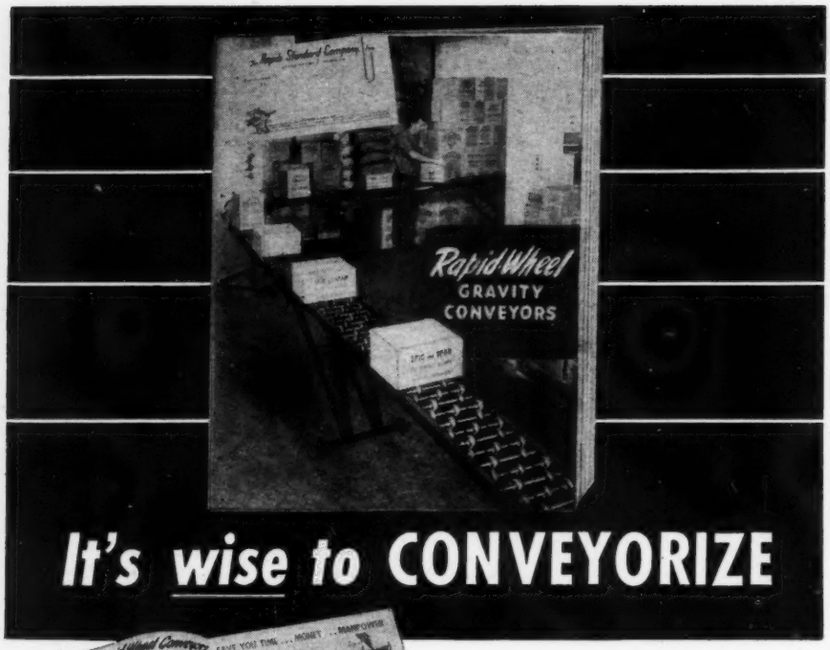
Special machining methods developed by Allied Products to form the radii on the two ends have made it possible to produce millions of these pins much more rapidly than by operations previously employed. Closer tolerances have been held. Because of lower manufacturing costs, the customer has realized appreciable savings.

In each of the four large, modern Allied plants new and better methods of manufacture are constantly being developed and put in use. The resulting benefits of faster production, higher quality and lower costs are reflected in parts now being produced for mass production industries. If you are not entirely familiar with our unusual facilities, let us send you our new brochure.

ALLIED PRODUCTS CORPORATION

DEPARTMENT 1-A
4632 LAWTON AVENUE
DETROIT 8, MICHIGAN

SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND PRECISION GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES



It's wise to CONVEYORIZE

Send for your FREE CATALOG

This catalog contains information about the construction features and uses of Rapid Wheel Gravity Conveyors, together with complete specifications and data on standard accessories manufactured for use with the conveyors. The catalog also shows on-the-spot photos of Rapid Wheel Gravity Conveyors in action on all types of conveying jobs.

Operating with the smooth gravity principle, Rapid Wheel Conveyors speed and ease the handling of goods wherever the need arises. Portable and easily handled, they may be set up or dismantled in a matter of minutes. They are manufactured in standard 5-foot and 10-foot lengths and in widths of 12" and 18". (Other lengths are manufactured upon request.)

Send for your copy of the new, illustrated catalog today. It shows how you can save time, money and manpower on your package handling operations . . . IT'S WISE TO CONVEYORIZE!

Please send the new Rapid Wheel Conveyor Catalog without charge or obligation to:

Mr. .....

Company ..... Title .....

Address .....

City ..... State .....

Manufacturers of
STEEL FORGED CASTERS - TRUCKS - CONVEYORS - POWER BOOSTERS

The Rapids-Standard Co., Inc.

employees in an appropriate bargaining unit choose to be represented by a collective bargaining representative, and (2) which, if any, such representative has been so selected.

3. Unless substantial questions relating to the representation issue or the agencies' determination thereof are involved, employers and labor organizations should expedite determinations by such agencies by agreeing to consent elections and by accepting the representation determinations of such agencies as final.

4. Pending the determination of representation questions, either by voluntary agreement of the parties or by the procedures provided in connection with determinations by such agencies, there should be no strikes, boycotts, or other interference with operations by employees or labor organizations, and no lockouts or unfair labor practices, as defined by law, by employers. Following such determination by a state or federal agency, both the employer and the certified collective bargaining representative should be protected by such agency, in the negotiation and orderly administration of a labor agreement, against interference by any other person or organization. Such interference should be made an unfair labor practice, to be dealt with by such agency in accordance with its established procedures.

5. To the end that the National Labor Relations Board may be enabled best to perform its functions in the prompt and impartial determination of representation questions, the board should remain as an independent agency and should be provided with adequate appropriations.

6. If, at the time for giving notice of revision or renewal prior to the expiration date of a labor agreement, there is a substantial doubt that a majority of the employees covered by the labor agreement desire that the existing bargaining representative continue to represent them, the employer should be entitled to give prompt written notice thereof to the existing bargaining representative and to the state or federal agency authorized to determine representation disputes. If the state or federal agency finds that a substantial doubt does in fact exist, it should, upon request of either party, proceed promptly to a redetermination of the question of representation through a consent election, provided that the existing bargaining representative desires to continue as such. Where two or more contending labor organizations are involved, the state or federal agency should conduct an election upon

New Life For Dead Ends

Put some fresh air in those confined working areas—and you'll put new life into the men who are working there.

At 110°F. a man's working efficiency is only about 10%. In foul air, his efficiency is equally low, and there's a chance he'll become ill. Fresh, cool air costs so little, it's a shame to lose so much working efficiency for lack of it.

You'll find a Coppus Blower designed for almost any type of dead end you may have — for underground cable manholes, furnaces, tanks, tank cars, etc., or around hot jobs like coke ovens or steam processes. They are also handy for cooling and drying equipment or materials in process.

Each one is portable . . . designed for the convenience of the workers and maximum use of air . . . built to Coppus "Blue Ribbon" specifications regarding materials and construction so as to take plenty of rough service.

For specific information, check and mail the coupon. Address Coppus Engineering Corp., 321 Park Avenue, Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in SWEET'S CATALOG, CHEMICAL ENGINEERING CATALOG and REFINERY CATALOG.

ANOTHER
COPPUS
"BLUE RIBBON" PRODUCT

COPPUS ENGINEERING CORP., 321 PARK AVENUE, WORCESTER 2, MASS.
Please send me information on the Blowers that clear the air for action.

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

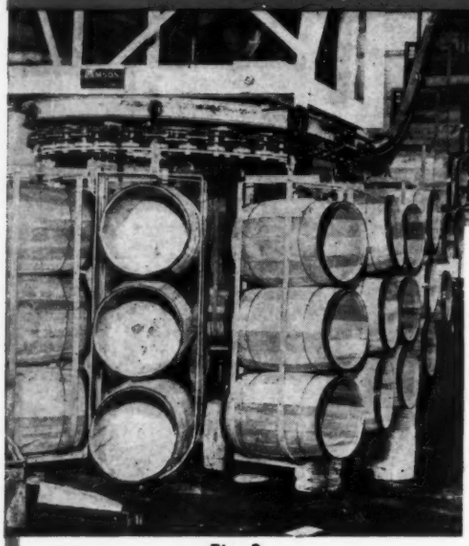
- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausters, welding fumes
- ☐ stirring up stagnant air wherever men are working or material is drying.

NAME.....
COMPANY.....
ADDRESS.....
CITY.....

(Write here any special ventilating problem you may have).

LAMSON OVERHEAD CONVEYOR PROVIDES FLOATING STORAGE

For 550 Kegs Between Receiving Room and Packing Department



- Relieves congestion in Receiving Room!
- Saves packers' time!
- Eliminates manual handling!
- Reduces 4 operations to 2!
- Saves Handling time and productive time in both departments!

Fig. 2

THE Lamson and Sessions Company, manufacturers of bolts, nuts, and hundreds of other metal fasteners, use about 550 12" kegs for each day's packing. Formerly, a truck brought them daily to an already crowded Receiving Room, and from there they were sent, 35 or 40 at a time, on a cleated belt conveyor, to the Packing Department. Upstairs, the kegs were carried 35 feet to the point of use. Lack of floor space prohibited more kegs being stored.

In conjunction with Lamson and Sessions engineers, LAMSON devised this Floating Storage on an Overhead Conveyor. Now the truckman unloads the kegs directly onto the conveyor (Fig. 1). They are carried up one flight, and across a balcony to an adjoining building, where they dip to a convenient height for the packers' use (Fig. 2). The system holds the daily requirement—550 kegs. No more congestion! No manual handling! 4 operations are cut to 2! No time is lost waiting for kegs when needed! Packers waste no time carrying kegs! This is a typical example of industrial saving and increased efficiency through LAMSON Mechanization.

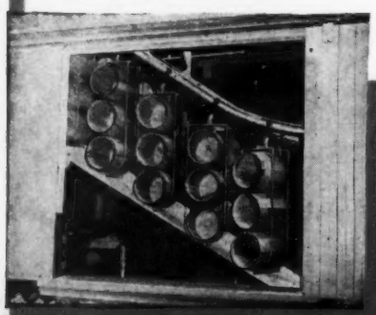


Fig. 1

Ask for Your **FREE COPY** of the new book "Utilize The Air Rights of Your Ceiling"

LAMSON CORPORATION
100 Lamson St., Syracuse 1, N. Y.

the request of either labor organization or the employer.

7. A state or federal agency having jurisdiction should not establish as appropriate a collective bargaining unit exceeding a single establishment (such as a plant or store) unless mutually agreed to by the employer or employers and the labor organization or organizations involved, or unless otherwise established by the prior collective bargaining practice of such employer or employers.

Jurisdictional Disputes

1. Jurisdictional disputes here under consideration are disputes between labor organizations over questions as to which labor organization should perform given types of work.

2. The public interest requires that interruptions to the production of goods and performance of services by strikes, boycotts, or other interference with operations arising out of jurisdictional disputes should be eliminated.

3. To this end, labor organizations should develop, publish, and file with the National Labor Relations Board definite procedures under which such jurisdictional disputes can be finally resolved. Such procedures should assure:

a. That no strike, boycott, or other interference with operations arising out of a jurisdictional dispute will occur.

b. That all jurisdictional disputes, whether arising between unions affiliated with the same organization, or between unions affiliated with different organizations, or between affiliated and non-affiliated unions, be determined under such procedures.

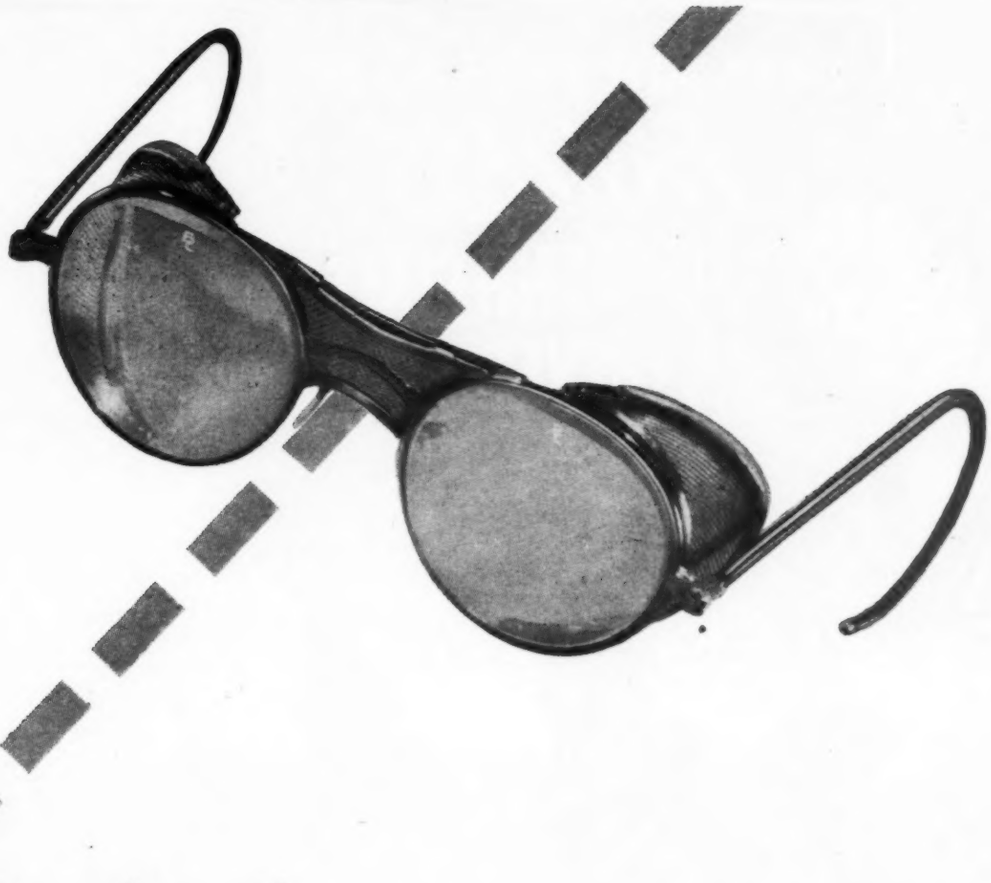
c. That pending settlement of a jurisdictional dispute, the work will proceed on the same basis on which it was being performed at the time the dispute arose, or if the work had not been commenced, it will be started as determined by the employer.

d. That the determination of a jurisdictional dispute will not require the violation of the terms of an existing valid labor agreement.

e. That in the determination of any jurisdictional dispute, the employer will not be required to employ more employees on any operation than are necessary properly to perform the operation, and that the determination will not unduly increase the cost of production or performance of services nor impair or restrict the responsibility of management to direct the working forces and conduct a successful business.

A determination of a jurisdictional dispute made in full accordance with these standards should be accepted and effectuated by the employer, employees and labor organizations involved.

4. In the event the procedures set



The Right Answer

TO THE $50,000,000 QUESTION

The Bausch & Lomb line of Safety Eyewear is complete . . . metal spectacle-type glasses or molded cup goggles with styles for every job application.

B&L

All B&L Safety Lenses now in production will be marked with this trademark . . . recognized as the symbol of the highest quality in optical products.

SAFETY eyewear that workers will *wear* is the workable answer to the problem of America's $50,000,000 annual eye accident cost. To write off your share of this burden you will want B&L Safety Eyewear . . . designed for *comfortable* all-day wear . . . offering complete protection against all eye hazards . . . fitted with plano lenses, or professionally prescribed corrective lenses when needed. Write for complete information. Bausch & Lomb Optical Co., 650 St. Paul Street, Rochester 2, N. Y.

BAUSCH & LOMB

B&L

Safety Eyewear

● It's a fact, that valve purchasers actually *pay less* for Lunkenheimer Valves—because these quality-built Valves give definitely *better service, longer service, more trouble-free and economical service.*

Maintenance men everywhere know they can confidently rely on the superior performance of any product bearing the Lunkenheimer name—backed as it is by a tradition of highest quality and skilled craftsmanship.

THE LUNKENHEIMER CO., Cincinnati 14, Ohio, U.S.A. Offices: New York 13, Chicago 6, Boston 10, Philadelphia 7. Export Department: 318-322 Hudson St., New York 13, N. Y.

YOUR LUNKENHEIMER DISTRIBUTOR plays a very important part in rendering the better valve service for which Lunkenheimer is noted. He is fully equipped and ready at all times to help you solve problems of valve maintenance or operation. Lunkenheimer Distributors are located in all industrial centers. There's one near you . . . call him for your requirements.

LUNKENHEIMER VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S. P.; BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS

forth in paragraph 3 above for the settlement of jurisdictional disputes without interference with operations are found to be inadequate to attain this objective, procedures incorporating these standards should be established by legislation to accomplish this objective.

5. Employers, in assigning work, should give due consideration to established jurisdictional practices with respect to given types of work, to the end of avoiding conditions which might lead to such jurisdictional disputes.

Making Initial Collective Agreements

1. Collective bargaining undertaken promptly and in good faith, following recognition of a properly established bargaining agent either by acceptance by the employer or by operation of lawfully constituted procedures, is viewed as the first step to avoid strike action by the union or refusal to bargain by the employer.

2. Observance of the following widely applicable rules will contribute to orderly and peaceful procedures in making the first contract:

a. The employer should not question his obligation to bargain with the union chosen as the bargaining agent for all employees in a properly established bargaining unit.

b. Neither side should delay immediate establishment of bargaining relationships and commencement of contract negotiations.

c. In their negotiations, the parties should look toward the preparation of a signed agreement covering a defined period of time.

d. Before specific bargaining on individual items is undertaken, each party should present to the other a general statement of its position and the parties should then explore them jointly. Areas of agreement should be carefully sought. Precise definition of the issues also should precede specific bargaining. In consummating their first agreement, the parties should carefully define its scope and terms.

e. It is well that respect and consideration be given to proposals presented by either the employer or the union and every reasonable effort made to bring about accord before any unreasonable ultimatum is issued by either side. Both sides should avoid inflammatory statements which question the sincerity or good faith of the other party.

f. Both parties should avoid threats or actions which interfere with normal operations while negotiations are still proceeding in good faith and until all other peaceful procedures have been exhausted.

3. Conciliation should be employed by the parties if collective bargaining has not resulted in agreement. Such conciliation may be private or public, and,

The Miniature Men of Sellersville, Pa.

ONE OF THE REASONS 6 OUT OF 10 PICK U. S. GAUGES

MODELMAKER'S SKILL TO Nth PRODUCTION-POWER

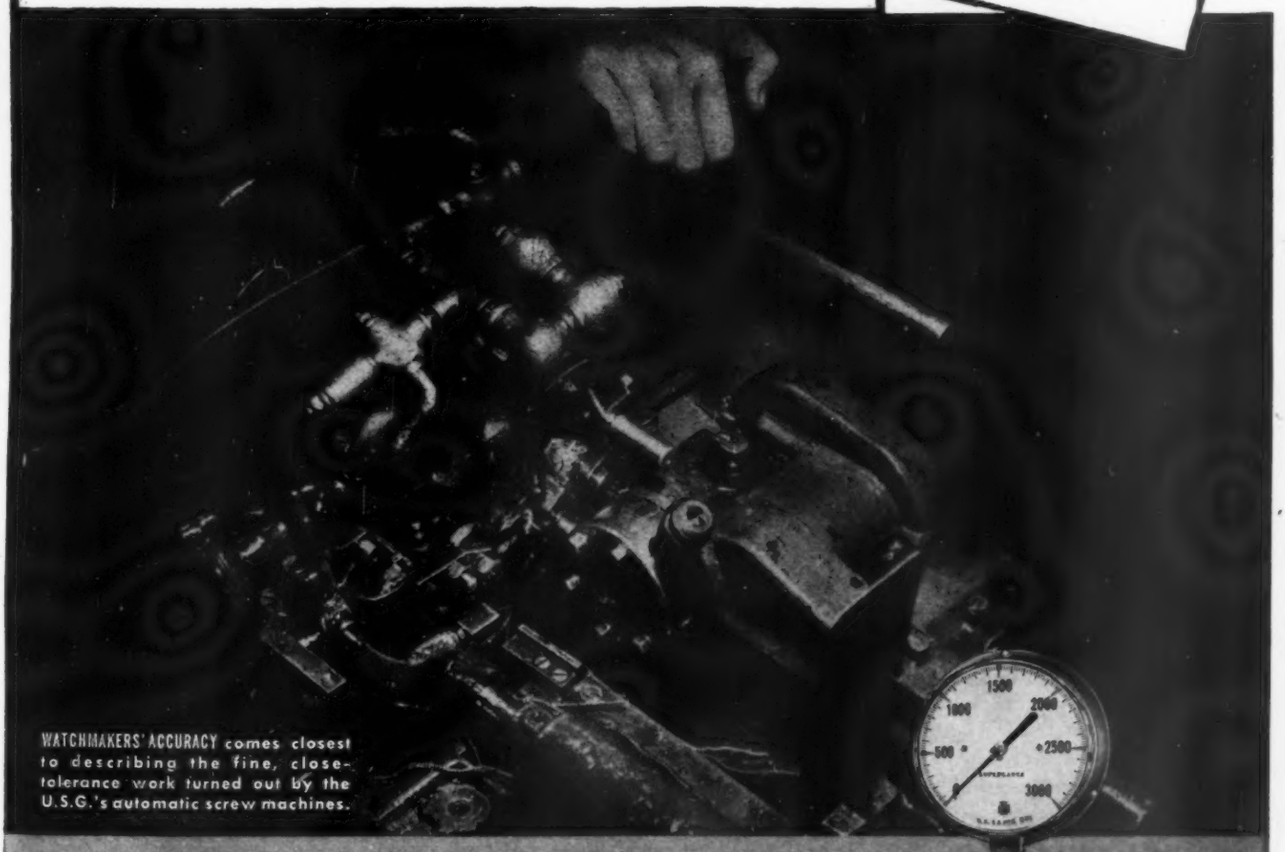
Among other things, a U. S. gauge is a marvel of columns, arbors, pinions, dowel posts, inserts and rivets, so small as to be the envy of a patient modelmaker, and accurate to a whisker. All parts of this type are produced to close tolerances in huge quantities on automatic machines. And all are made right in U. S. G.'s own Sellersville plant.

WHY 6 OUT OF 10 CHOOSE U. S. GAUGE

U. S. Gauge is famed for making 99-44/100% of its own parts . . . from the raw material level. Many of these manufacturing steps are exclusive with U. S. Gauge. Even more vital to you is U. S. G.'s *Manufacturing Control*, a system that keeps tabs on materials, manufacturing, assembly, calibration, testing, inspection . . . assures you the quality preferred by over 6 out of 10 experienced buyers.

SEEMS LIKE EVERYBODY WANTS THIS GAUGE CATALOG

Men of many titles in dozens of industries have swamped us with requests for the big new U. S. Gauge catalog. 102 pages. Packed with facts about gauges, gauge manufacture, gauge movements. Designed especially for quick reference, ease in ordering. Your name on your business letterhead will reserve your copy of this catalog.



WATCHMAKERS' ACCURACY comes closest to describing the fine, close-tolerance work turned out by the U.S.G.'s automatic screw machines.

UNITED STATES GAUGE

DIVISION OF AMERICAN MACHINE AND METALS, INC.

SELLERSVILLE, PA.

Manufacturers of Pressure, Temperature, Flow, and Electrical Measuring Instruments

U.S. INSTRUMENTS Tell The Truth

USG

CM

Here is the Subtractor of Materials Handling Costs

METEOR

CM Bulletin 142 illustrates and describes every operating feature that makes the CM Meteor Heavy Duty Electric Hoist an outstanding production time-saver . . . cutting deep into materials handling costs. Helical gears, aeroplane cooling, low headroom, safety limit brake, simplified maintenance . . . these and other advantages are explained in terms of operating efficiency and service life. Various types trolleys and accessory equipment, lift and speed tables, dimensions, etc., are included.

We invite you to write today. Just ask for Bulletin 142.

Capacities from ½ ton and up. Lifting speeds from 18 to 60 feet per minute . . . Low headroom. Hook suspension, plain, geared or motor driven trolley.

CHISHOLM-MOORE

HOIST CORPORATION

(Affiliated with Columbus-McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: 130 Fremont Ave., TONAWANDA, N. Y.

SALES OFFICES: New York, Chicago and Cleveland

if public, local, state, or federal, as best suited to the circumstances.

4. Conciliation, however, should not be the first resort of parties, but should be undertaken only after reasonable time and full effort to reach agreement has been made by direct negotiation.

5. The conciliator should, wherever possible, be invited by both parties to participate. If that is not possible, the best practice is for the party inviting the conciliator to notify the other party of this action.

6. If direct negotiations and conciliation have not been successful, voluntary arbitration may be considered by the parties; however, before voluntary arbitration is agreed upon as a means of settling unsettled issues, the parties themselves should agree on the precise issues, the terms of submission, and the principles or factors by which the arbitrator shall be governed.

7. If the dispute is not settled by collective bargaining, conciliation, or voluntary arbitration, it should be the obligation of the parties to give the governor of the state in which the dispute is pending 10 days' notice before any strike or lockout.

8. In cases where, in the opinion of the governor, a strike or lockout would constitute a public emergency or endanger the health or safety of the public, the governor should be empowered to arrange for the appointment of a fact-finding panel. Such a panel should be nominated, upon request of the governor, by the chief judicial officer of the state and should consist of outstanding citizens who do not reflect either employer or employee interests.

9. In cases where a national emergency is involved, or national health or safety is endangered, the President of the United States, upon his own motion, should be empowered to appoint a similar panel.

10. Such a panel in either of the above cases should hear both sides through their own witnesses and within 30 days make public the facts concerning it, without recommendation. Upon the appointment of such a panel and for not less than 10 days following publication of the facts as found by it, the parties should be obligated to maintain the status quo unless a settlement is arrived at in the meantime.

11. We feel that if these steps are taken public opinion will bring its great

AIRTRON

One of the War's unusual achievements in new materials

Vitally important to the Superfortress flying over Tokyo was the need for keeping windows from fogging. Working with aircraft manufacturers and Air Force engineers, Arrowhead research men developed the defroster and cabin heater ducts used in the B-29, the P-51 and other airplanes. Where AIRTRON has been used no lives or equipment have been lost as a result of air ducting failures.

AIRTRON, fabricated of glass cloth and rubber, is flexible, withstands extremes in heat and cold, possesses high insulating qualities and other favorable characteristics. It will replace sheet metal ducts, ordinary pipe and hose in thousands of applications. It will be used in containers, tanks, pumps, etc.; in food, beverage and chemical industries where corrosion is a factor. The heating, ventilating and air-conditioning of your future planes, trains, automobiles, buses and homes will use a great deal of AIRTRON—the new versatile material.

Arrowhead research men are now working with a number of manufacturers who are desirous of employing AIRTRON in their products and processes.

Tell us what you make and Arrowhead engineers will gladly make available information concerning the characteristics suitable to your needs. Write us today.

*Trademark Registered

ARROWHEAD RUBBER COMPANY

2244 EAST 37th STREET • LOS ANGELES 11, CALIFORNIA

Division of National Motor Bearing Co., Inc.

ENGINEERS and MANUFACTURERS of MECHANICAL RUBBER PRODUCTS

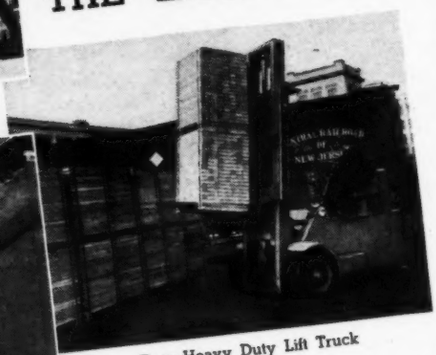
In addition to AIRTRON products the Arrowhead Rubber Company manufactures a wide selection of molded, extruded, and hand-built items. You will like doing business with Arrowhead—four-time winner of the Army-Navy E for efficient production. Consults with us on your rubber problems.

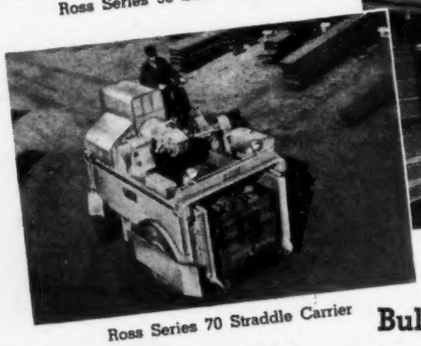
8 Reasons Why
THE ROSS SYSTEM
Cuts Handling Costs

1. Eliminates all hand lifting and loading.
2. Minimizes manual re-handling of pieces.
3. Lessens tiresome toil for the workmen.
4. Standardizes on unit-assembly of pieces.
5. Saves valuable ground and storage space.
6. Keeps materials moving faster . . . for less.
7. Reduces operational overhead expense.
8. Increases profit-margins for the owner.

Get the Facts about
ROSS Straddle CARRIERS and LIFT TRUCKS . . . . . FOR THE BIG JOBS

Ross Series 90 Straddle Carrier


Ross Heavy Duty Lift Truck


Ross Series 70 Straddle Carrier

Write for Bulletin F-16 Today

THE ROSS CARRIER COMPANY • Benton Harbor, Michigan
Direct Factory Branches and Distributors Throughout The United States and Canada

ROSS
HEAVY DUTY MATERIALS-HANDLING EQUIPMENT

force into play in a settlement of the controversy.

Administration of Agreements

The usual collective bargaining agreement applies to and is administered by people of varying personality, temperament, and understanding. It should, therefore, be as clear and simple as practicable and written in layman's terms. Furthermore, it should be thoroughly understood by the employer and employees, and the representatives of both. This will frequently require appropriate discussions and educational campaigns, conducted by the respective parties.

Harmonious operation under an agreement, however, requires more than clarity of language and of understanding. There must be an honest effort on the part of all to effectuate the spirit as well as the letter of the agreement, a continuous demonstration by the parties of their willingness to conduct their relations on a basis of mutual fairness and respect.

While adherence to the foregoing principles will do much to insure the smooth and proper functioning of an agreement, grievances and disputes involving the interpretation and application of the agreement will, nevertheless, inevitably arise, for the adjustment of which adequate provision should be made. This requires procedural clauses for the settlement of such grievances and disputes, and a firm commitment by managements and unions that these procedures will be followed as a substitute for strikes and lockouts.

Recommendations

It is therefore recommended as follows:

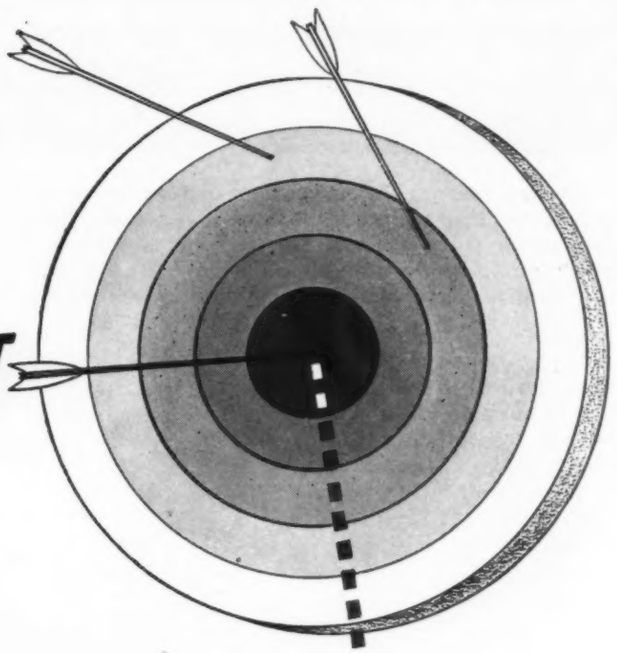
1. Collective bargaining agreements should contain provisions that grievances and disputes involving the interpretation or application of the terms of the agreement are to be settled without resort to strikes, lockouts, or other interruptions to normal operations by an effective grievance procedure with arbitration as its final step.

2. To be effective, the procedure established for the settlement of such grievances and disputes should meet at least the following standards:

a. The successive steps in the procedure, the method of presenting grievances or disputes, and the method of taking an appeal from one step to another should be so clearly stated in the agreement as to be readily understood by all employees, union officials, and management representatives.

b. The procedure should be adaptable to the handling of the various types of griev-

YOU NAME IT



We at Lawson's,

along with many in associated industries, call our work precision manufacture. But there's more to it! Far more to it! Our craftsmen and engineers are actually artists in every sense of the word, proud of the top-notch quality of their work, proud of their ability to produce in huge quantities precision manufacture. Combine quality, ability, and experience — the only name we can think of with **guaranteed results** *is Lawson.*

PRECISION *Lawson*

Hollow spindle for radar equipment. These spindles are ground all over, including the thread, and have diameters held to .0002".

LAWSON MACHINE and TOOL CO.

120 MOUNTAIN AVENUE, MALDEN 48, MASS.

Even traces of impurities in the air may threaten product quality or production efficiency

Unknown factors, impurities in ordinarily imperceptible quantities contaminate air and often cause rejects and production slow-downs. The examples below illustrate how you can eliminate this danger by adding control of air quality to your product quality control program.

FOR EXAMPLE:

Dorex *activated carbon* Air Recovery Equipment installed in a ventilating system, or in portable units, is helping maintain control of product quality by purifying air in recirculation or at outdoor air intake in plants like these:

Food Processing Plant: Self-generated odorous impurities had been contaminating food and food ingredients during processing and storage.

Plastic Manufacturing Co.: Air-borne gases and impurities, principally chlorine from a neighboring plant, had been interfering with finishing.

Precision Instrument Plant: Air-borne gases had been coating metals, thereby changing dimensions of instruments during manufacture.

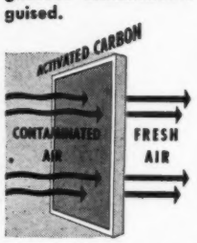
Film Manufacturing Plant: Impurities in outdoor air supply, principally phosphorous from a smelting operation several miles distant, had been causing erratic results in the sensitivity of film.

PROOF:

A simple, inexpensive test can be made in your plant to demonstrate the effectiveness of a complete Dorex installation. If you would like to investigate the value of adding air quality control in your plant, write to W. B. Connor Engineering Corp., Research Department, New York, N. Y.

Works like a gas mask

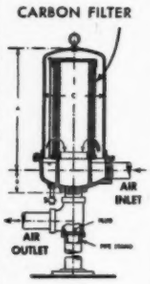
Nothing is added to the air. Vaporous and gaseous contaminants are removed, not disguised.



Activated carbon is the most powerful adsorption material known. It has been used for many years in industry for the recovery of chemicals in vaporous and gaseous form. Dorex installations are effectively removing air-borne contaminants like these:

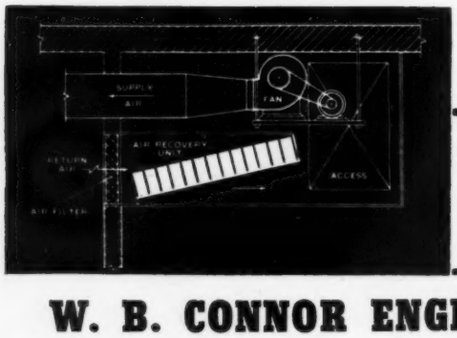
Acetic Acid	Body Odors	Hydrogen Sulphide
Acetone	Carbon Tetrachloride	Lactic Acid
Acrolein	Chlorine	Mercaptans
Alcohols	Cooking Odors	Phenol
Amylacetate	Ethylacetate	Pyridine
Benzol	Ether	Sulphur Dioxide
Butylacetate	Formaldehyde	Turpentine
Butyric Acid	Gasoline	Valeric Acid

The Dorex PL Unit for Compressed air lines



For purifying Compressed air. Extracts oil vapors, fermentation odors and other gaseous impurities not eliminated by filters, separators, after coolers or receivers. Successful applications have been made where compressed air is used for the agitation of foods, drugs, chemicals, medicines and cosmetics, and where it is used for instrument control.

Savings in fuel, power and equipment is another important Dorex advantage. Send for FREE folder detailing savings made by a Dorex installation in the First National Bank Building, Detroit. Write Dept. K for your copy.



Typical application of Dorex Equipment for purifying recirculated air. Dorex types and sizes permit easy installation in most existing systems. In addition, portable units are available to eliminate intermittent or localized concentrations of contaminants.

W. B. CONNOR ENGINEERING CORP.

AIR RECOVERY • AIR PURIFICATION • AIR DIFFUSION

114 East 32nd Street — **New York 16, N. Y.**

ances and disputes which come under the terms of the agreement.

c. The procedure should be designed to facilitate the settlement of grievances and disputes as soon as possible after they arise. To this end: (1) The agreement should provide adequate stated time limits for the presentation of grievances and disputes, the rendering of decisions and the taking of appeals. (2) Issues should be clearly formulated at the earliest possible moment. In all cases which cannot be settled in the first informal discussions, the positions of both sides should be reduced to writing. (3) Management and union should encourage their representatives to settle at the lower steps grievances which do not involve broad questions of policy or of contract interpretation and should delegate sufficient authority to them to accomplish this end. (4) The agreement should provide adequate opportunity for both parties to investigate grievances under discussion. (5) Provisions should be made for priority handling of grievances involving discharge, suspension, or other disciplinary action.

d. The procedure should be open to the submission of grievances by all parties to the agreement.

3. Managements and unions should inform and train their representatives in the proper functioning of the grievance procedure and in their responsibilities under it. In such a program it should be emphasized that:

a. The basic objective of the grievance procedure is the achievement of sound and fair settlements and not the "winning" of cases.

b. The filing of grievances should be considered by foremen or supervisors as aids in discovering and removing causes of discontent in their departments.

c. Any tendency by either party to support the earlier decisions of its representatives when such decisions are wrong should be discouraged.

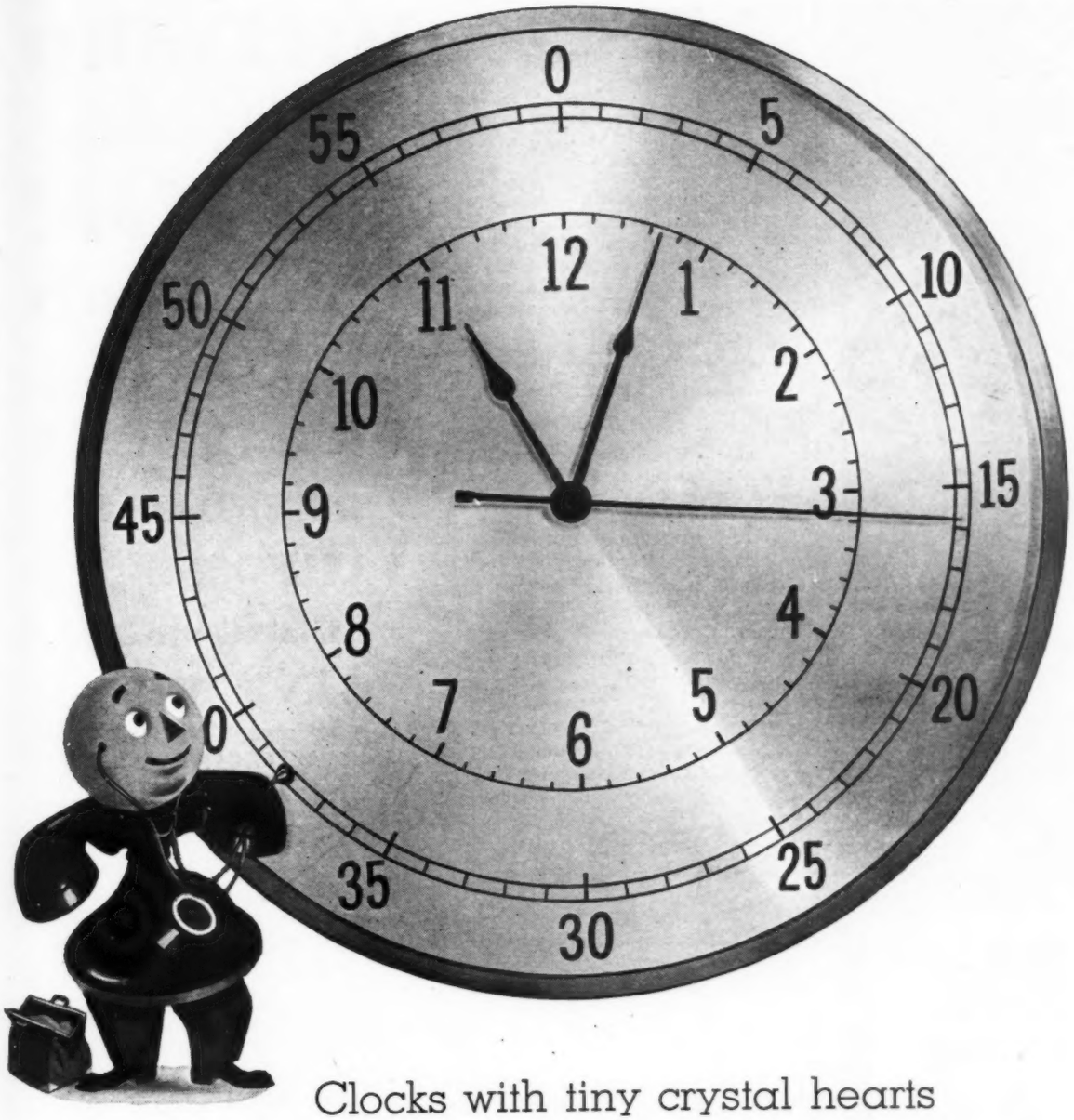
d. The willingness of management and union officials to give adequate time and attention to the handling and disposition of grievances and disputes is necessary to the effective functioning of the procedure.

e. For the sound handling of grievances and disputes both management and union representatives should be thoroughly familiar with the entire collective bargaining agreement.

4. The parties should provide by mutual agreement for the final determination of any unsettled grievances or disputes involving the interpretation or application of the agreement by an impartial chairman, umpire, arbitrator, or board. In this connection the agreement should provide:

a. A definite and mutually agreed upon method of selecting the impartial chairman, umpire, arbitrator, or board.

b. That the impartial chairman, umpire, arbitrator, or board should have no power to



Clocks with tiny crystal hearts that beat 100,000 times a second

CRYSTAL HEARTS beat time in Bell Telephone Laboratories, and serve as standards in its electronics research. Four crystal clocks, without pendulums or escapements, throb their successive cycles without varying by as much as a second a year.

Precise time measurements may seem a far cry from Bell System telephone research, but time is a measure of frequency, and frequency is the foundation of modern communication, whether by land lines, cable, or radio.

These clocks are electronic devices developed by Bell Laboratories, and refined over years of research. Their energy is supplied through vacuum tubes, but the accurate timing, the controlling heart of the clock, is provided by a quartz crystal plate about the size of a postage stamp.

These crystal plates vibrate 100,000 times a second, but their contraction and expansion is submicroscopically small—less than a hundred-thousandth of an inch. They are in sealed boxes to avoid any variation in atmospheric pressure, and their temperatures are controlled to a limit as small as a hundredth of a degree.

Bell Laboratories was one of the first to explore the possibilities of quartz in electrical communication, and its researches over many years enabled it to meet the need for precise crystals when war came. The same character of research is helping to bring ever better and more economical telephone service to the American people.

BELL TELEPHONE LABORATORIES *Exploring and inventing, devising and perfecting for continued improvements and economies in telephone service.*

OLD FAITHFUL CRAYONS

to meet the most exacting requirements

Made by Crayon Specialists—backed by a guarantee that has never failed in 110 years of crayon manufacturing — American Old Faithful Markers will meet the most exacting marking and checking needs of every industry.

Send for the FREE booklet giving complete information about our extensive Industrial Crayon line.

Dept. F-11

THE AMERICAN CRAYON COMPANY

THEY SAY AND DO *(continued)*

add to, subtract from, change, or modify any provision of the agreement but should be authorized only to interpret the existing provisions of the agreement and apply them to the specific facts of the grievance or dispute.

c. That reference of a grievance or dispute to an impartial chairman, umpire, arbitrator, or board should be reserved as the final step in the procedure and should not be resorted to unless the settlement procedures of the earlier steps have been exhaustd.

d. That the decision of the impartial chairman, umpire, arbitrator, or board should be accepted by both parties as final and binding.

e. That the cost of such impartial chairman, umpire, arbitrator, or board should be shared equally by both parties.

5. Any question not involving the application or interpretation of the agreement as then existing but which may properly be raised pursuant to agreement provisions should be subject to negotiation, conciliation, or such other means of settlement as the parties may provide.

6. Nothing herein is intended in any way to recommend compulsory arbitration, that is, arbitration not voluntarily agreed to by the parties.

Renewal of Agreements

Where an agreement contains a renewal clause and a change or modification or reopening of the agreement is requested by either party or where the existing agreement is about to be terminated, ample time prior to the termination of the agreement should be provided for the negotiation of a new or modified agreement. If such negotiations should fail, the parties should follow the procedures recommended for the settlement of disputes over the making of initial agreements.

United States Conciliation Service

1. A federal conciliation service, which by its impartiality and efficiency wins the respect of the public, management, and labor, will be a strong force in minimizing industrial disputes and preventing strikes.

2. The parties to labor disputes should conscientiously exhaust all possibilities of settlement through collective bargaining before either party requests conciliation or mediation services.

3. As far as possible, and wherever practicable, disputes should be settled at the plant level. Local, state, or federal conciliation agencies should be used, as

HILLYARD

Hi-Quality

FLOOR

Treatments

AND

Maintenance

PRODUCTS

★ **DEPENDABLE**

★ **UNIFORM**

★ **ECONOMICAL**

★ **SAVE TIME**

AND PROPERLY PROTECT AND MAKE ATTRACTIVE ALL TYPES OF FLOORS AND GIVE ENTIRE SATISFACTION WITH LESS LABOR.

There is a Hillyard Floor Treatment Engineer in your locality, he will gladly give advice and recommendations on any maintenance problem, call or wire us today, no obligation.

Send for your FREE copy of this new book, full of real information. Write now.

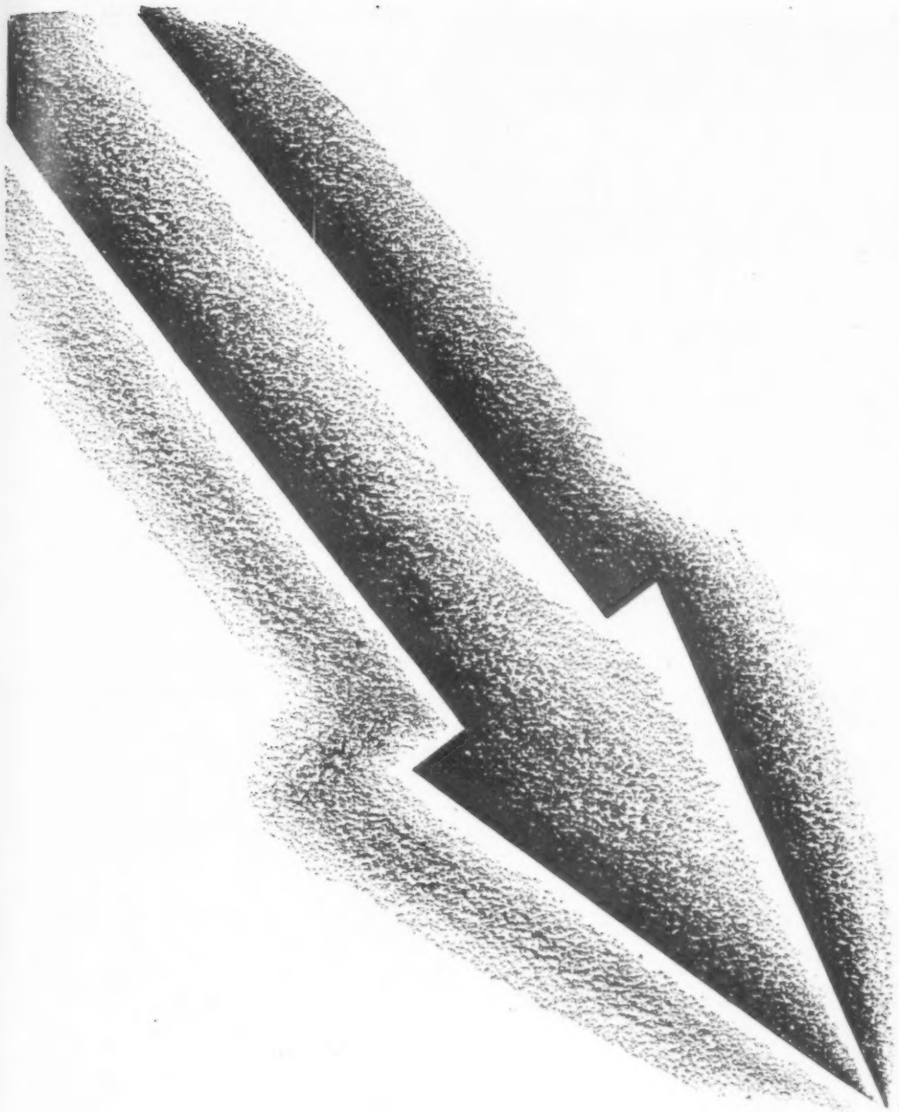
THE HILLYARD COMPANY

DISTRIBUTORS

Hillyard Chemical Co., St. Joseph, Mo.

370 TURK ST., SAN FRANCISCO, CALIF.

1947 BROADWAY, NEW YORK, N. Y.



Larger loads without rehandling. Less lost motion—less wasted time. Various types of "below-the-hook" devices. Shielded electrification minimizes hazards of exposed wiring. All steel construction—a heavier system—engineered with anti-friction bearings. Puts more handling labor to PRODUCTIVE WORK. Write or wire for Engineering Bulletin and give details of your handling problem.

THE FORKER CORPORATION
1805 EAST 47th STREET, CLEVELAND 3, OHIO

HEIN-WERNER HYDRAULIC JACKS

Save TIME and LABOR in a "Thousand and one" Applications

The rugged construction and smooth, powerful operation built into Hein-Werner Hydraulic Jacks are prime reasons behind their ability to save time and labor throughout industry . . . and that's why these modern jacks are being utilized in a "thousand and one" applications.

Because they are *built right* and *priced right,* we still maintain that "today there are no better jacks made than those developed and produced by Hein-Werner."

When you encounter problems involving pushing, pulling, raising or lowering, look to H-W Jacks to provide a time and labor-saving solution. Built in capacities of 3-5-8-12-20-30 and 50 tons. For details, consult your nearest industrial supply distributor, or write us.

HEIN-WERNER MOTOR PARTS CORP.
Waukesha, Wisconsin

HEIN-WERNER HYDRAULIC JACKS
Are Built Right and Priced Right

best suited to the circumstances. It is desirable to secure close coordination between the activities of the federal, state, and local conciliation services.

4. Every effort should be made toward the reorganization of the United States Conciliation Service to the end that it be established as an effective and completely impartial agency within the Department of Labor.

5. In order to obtain the advice, assistance, support, and confidence of management and labor, a representative advisory committee to the director of the United States Conciliation Service should be appointed. The advisory committee should consist of equal numbers of representatives of management and labor selected by the Secretary of Labor from a list of nominees submitted by leading organizations of employers and labor.

6. The advisory committee should be responsible for making recommendations to the Secretary of Labor or to the director of the Conciliation Service with respect to the policy, procedures, organization and the development of adequate standards and qualifications for the personnel of this service.

7. The personnel of the Conciliation Service should be characterized by impartiality, integrity, and a knowledge of labor-management problems. To this end, we recommend:

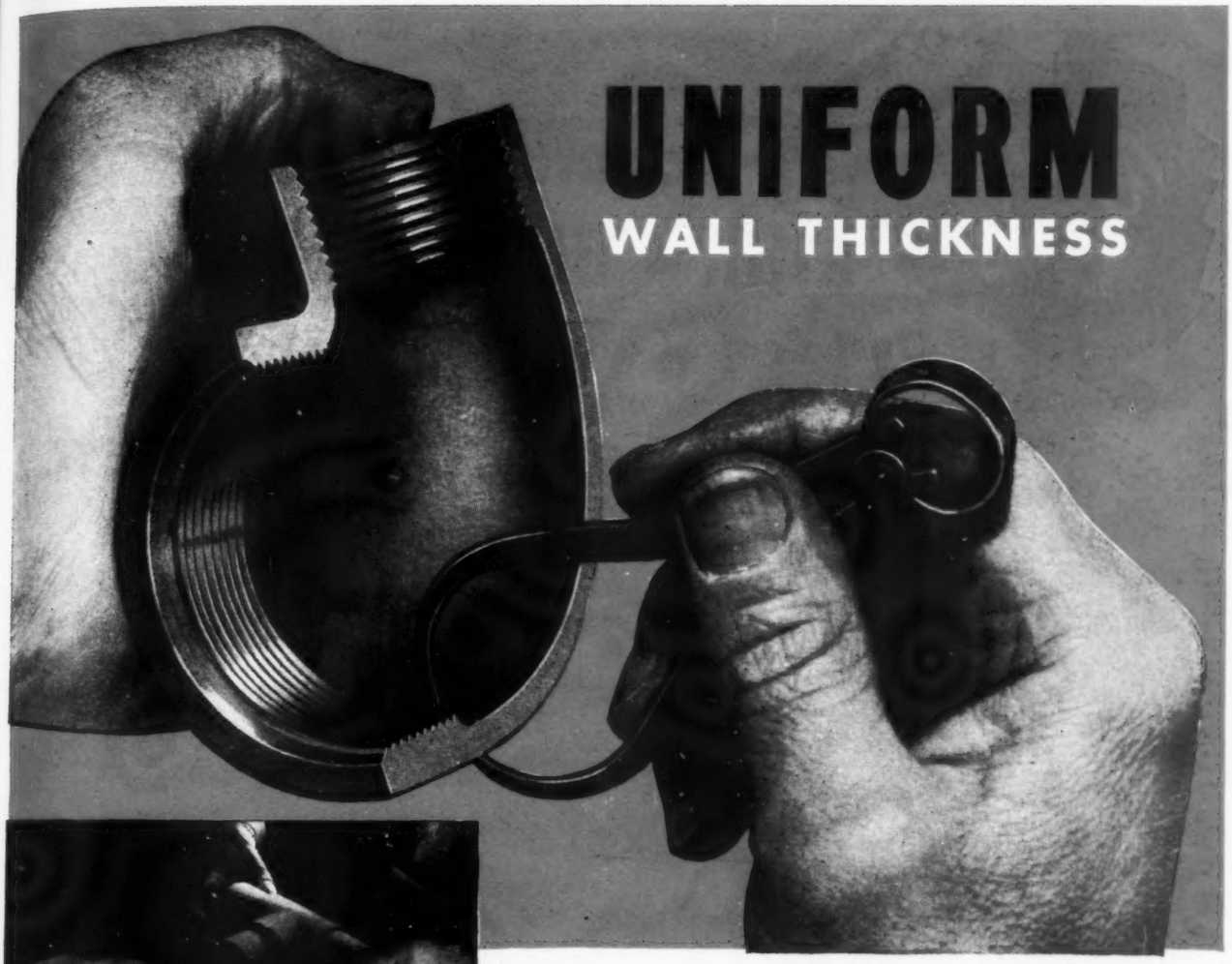
a. Conciliators should be appointed without regard to Civil Service requirements.

b. The salaries of commissioners and officers in the Service should be sufficient to attract persons possessing the necessary qualications.

c. Provisions should be made for practical training for newly-appointed conciliators. During such training, the newly-appointed conciliators should be assigned as observers in the course of actual conciliation of a variety of cases. Adequate facilities should be made available to assure thorough knowledge on the part of conciliators of the policies of the service, techniques of conciliation, labor laws, and industrial relations practice. Current information services should be made available to all conciliators to keep them currently abreast of developments in the Conciliation Service and to provide them with up-to-date information on current labor law and industrial relations practice. In addition, periodic refresher courses should be conducted in the interest of maintaining high standards of service.

d. The number of conciliators should be adequate to permit the service to perform conciliation functions adequately and promptly.

e. Congress should immediately make



Careful setting of cores assures uniform wall thickness.

. . . yet Grinnell Pipe Fittings cost no more

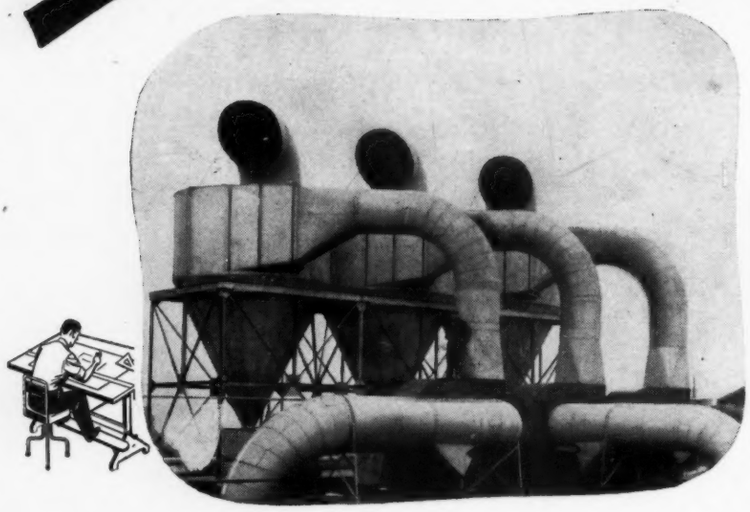
Rigid standards of manufacture, strictly maintained, make every Grinnell Pipe Fitting a *good fitting*. Their uniformity of wall thickness, for instance, is assured by Grinnell's high-grade pattern equipment and careful setting of cores. Other features which make every Grinnell fitting easy to use include: smooth surfaces inside and out, sharp, clean threads for easy starting and tight joints, and accurate sizing. Specify Grinnell Fittings – with the Grinnell "G" trade mark – and you get uniformly fine fittings at no increase in cost. Available through branch warehouses and jobbers everywhere. Write for Catalog 5-B. Grinnell Company, Inc., Executive Offices, Providence 1, R. I.

GRINNELL

FOUNDED 1850

WHENEVER **PIPING** IS INVOLVED

Back of EVERY KIRK & BLUM Dust Control INSTALLATION



. . . 38 YEARS OF Specialized Engineering Experience

● No sudden "inspiration" or new-era "magic" accounts for the superior performance and economy of Kirk & Blum dust control installations.

Kirk & Blum success is due to sound, practical engineering know-how, gained slowly and soundly through 38 years of specialization . . . 38 years of solving every known type of dust control problem.

In size, facilities and satisfied customers—including leading industrial plants throughout the nation—the Kirk & Blum organization has advanced from early pioneering days to its present recognized position in the industry. Yet its basic character and ideals remain the same, rooted as they are in a management and personnel which for the major part has been with us for more than three decades.

For a complete new dust control installation, or a remodeling of your present equipment, you will find it pays to rely on Kirk & Blum's long-accumulated knowledge and skill. For details, write to The Kirk & Blum Manufacturing Co., 2835 Spring Grove Ave., Cincinnati 25, Ohio.

KIRK AND BLUM
(AN ORGANIZATION OF) (ENGINEERS AND MECHANICS)

available funds for improving and strengthening the service.

8. Conciliation must, under all conditions, be maintained as distinct and separate from arbitration. A commissioner of conciliation must never be assigned to a case as an arbitrator, except where a written request for his services as arbitrator has been made by both parties to a dispute.

9. The division of arbitration of the United States Conciliation Service should be reorganized. We recommend that the permanent arbitrators now employed, with the exception of the chief of the arbitration service, be transferred or absorbed in some other work where their experience, talents, or skill can be utilized. The chief of the division should not act as an arbitrator.

10. The division of arbitration should have a pool or list of capable, trained, impartial arbitrators. They should be paid on a *per diem* basis at rates approved by the director. From this pool, arbitrators may be assigned to cases when requested by both parties.

11. A complete list of arbitrators, with a summary statement of experience and qualifications of each, should at all times be available to labor and management representatives.

12. The scope of the arbitration and the method of enforcement of the decision shall be determined by the terms of the contract being arbitrated or by agreement of the parties.

13. It is recommended that the technical service division be reorganized, that it be manned by a qualified and impartial staff. It should operate with the advice and counsel of a technical advisory committee.

14. The technical advisory committee should consist of equal numbers of representatives of management and labor, selected by the Secretary of Labor from a list of nominees submitted by leading organizations of employers and labor. The technical advisory committee should have available the services of staff assistants from the staff of the Division of Labor Standards and the Bureau of Labor Statistics. The technical service division should work in close cooperation with the technical advisory committee, the U. S. Conciliation Service, and the Bureau of Labor Statistics, to the end that the data and services of these agencies be available to the Conciliation Service whenever needed.

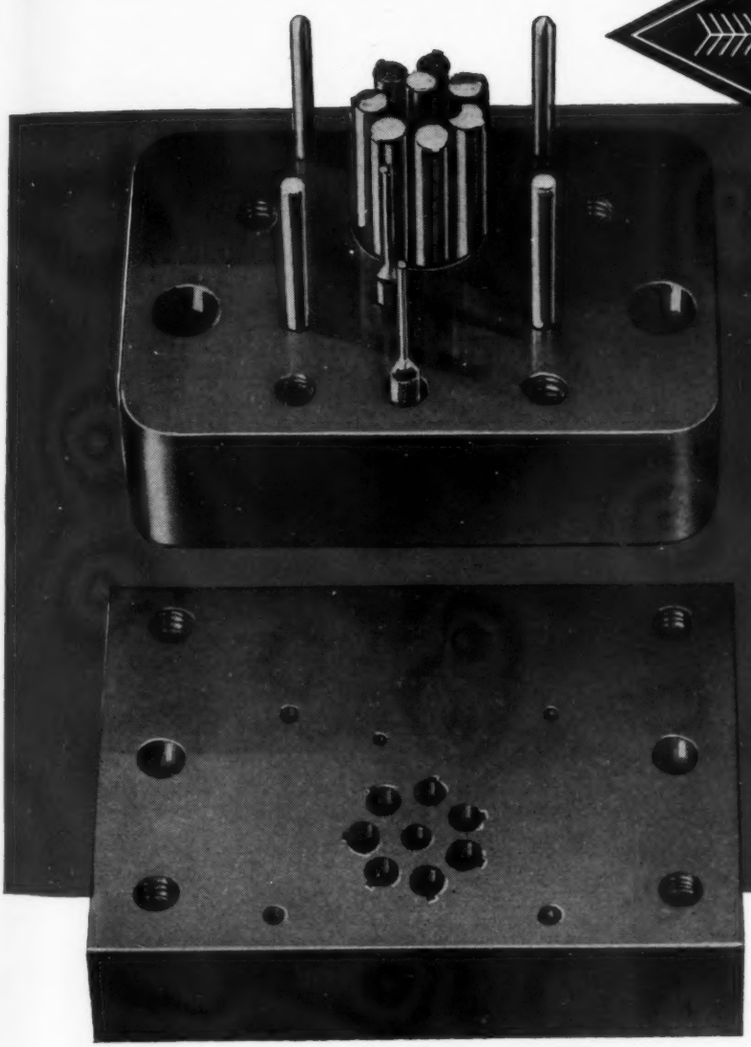
15. Nothing herein is intended in

Today's keynote—

PRODUCTION ECONOMY

Today's answer—

INVARO



These Invaro oil-hardening steel blanking dies are meeting a difficult requirement of close tolerance—held to .003 after heat treating . . . no tendency to shrink, warp or change dimensions. Uniform hardness and long life mean high production at low cost.

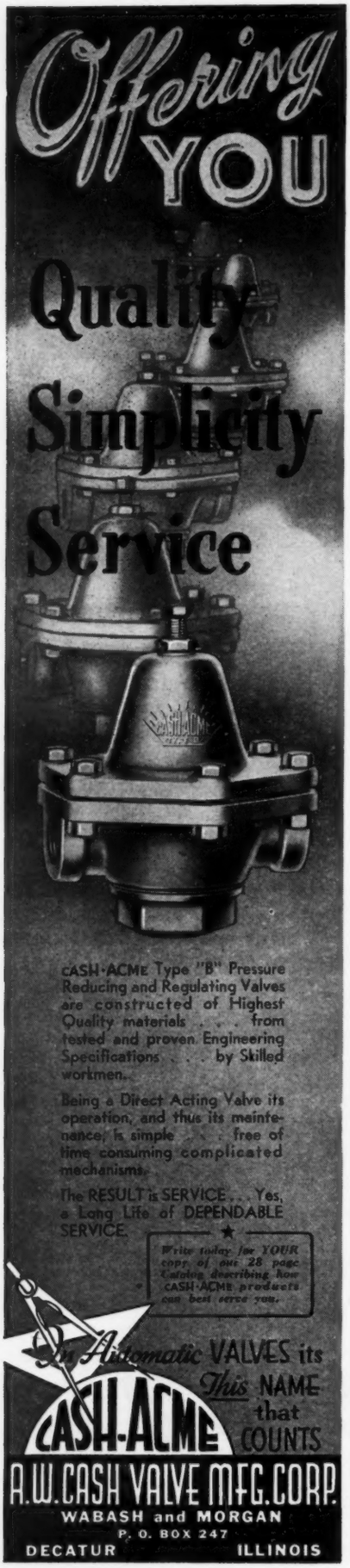
Look into Invaro for operations such as blanking, punching, forming, piercing, perforating, etc.

If YOU have a die steel problem . . .

Call Firth-Sterling

STEEL COMPANY

McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND • DAYTON • DETROIT • CHICAGO • LOS ANGELES


Offering YOU
Quality
Simplicity
Service
CASH-ACME Type "B" Pressure Reducing and Regulating Valves are constructed of Highest Quality materials . . . from tested and proven Engineering Specifications . . . by Skilled workmen.
Being a Direct Acting Valve its operation, and thus its maintenance, is simple . . . free of time consuming complicated mechanisms.
The RESULT is SERVICE . . . Yes, a Long Life of DEPENDABLE SERVICE.
Write today for YOUR copy of our 28 page Catalog describing how CASH-ACME products can best serve you.
In Automatic VALVES its This NAME that COUNTS
CASH-ACME
A.W. CASH VALVE MFG. CORP.
WABASH and MORGAN
P. O. BOX 247
DECATUR ILLINOIS

any way to recommend compulsory arbitration. The use of all services offered by the U. S. Conciliation Service should continue to be voluntary.

•

Ford Asks Union for Work Guarantees

This is the letter sent on November 15 to the United Automobile Workers —CIO prefacing the 31 contract modifications suggested by the Ford Motor Company:

Gentlemen: We have received several communications from you relative to proposed amendments to the contract between UAW-CIO and the Ford Motor Company. These comunications include a proposal for a 30 percent wage increase which is not covered in our present contract.

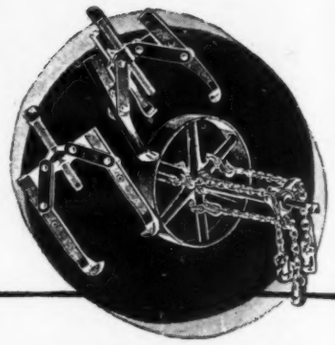
The Ford Motor Company will shortly meet with representatives of the union to negotiate all of your proposals. We request that at this meeting the company's proposed amendments to the present contract and other changes in the relationship between the company and the union also be negotiated. A list of such proposed changes and amendments is attached hereto.

We want in this letter to state our general position on the question of wage increases at this time. We also draw your attention to circumstances which threaten company security. These circumstances have led us to Proposal Number 3 in the attached list.

The Ford Motor Company is today paying the highest wages in the automotive industry. We shall pay higher wages whenever we are sure that we can pay them and still maintain this company as a sound and growing business. We want always to be able to pay the highest wages in the industry.

We do not believe that this is the time to attempt to settle on general wage increases. They would have to be based on guesses of what our volume of production and our costs are going to be, and on guesses as to what earnings —if any—we may be able to make. We feel that a general increase such as you propose would amount to a very heavy mortgage on the future of all of us—the Ford Motor Company and its employees alike.

We are now finishing reconversion and shooting as hard as we can toward maximum production. Every dollar of company profits during the war years is already committed to plant expansion, improvement of working conditions, and installation of methods and machines to



ARMSTRONG-BRAY

GEAR AND WHEEL PULLERS

Our Prompt Delivery Will Speed your Re-conversion—these lifetime service tools save valuable hours, prevent costly breakage and long shut downs.

STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not slip from work. Arms are forged and heat-treated. 2-arm, 3-arm and special designs. 34 types and sizes.

CHAINGRIP Universal Pullers pull wheels, solid gears, pinions, etc., even at considerable distance from end of shaft. Proof-tested chains have both chain hooks and special pulley hooks. 3-ton and 12-ton capacities.

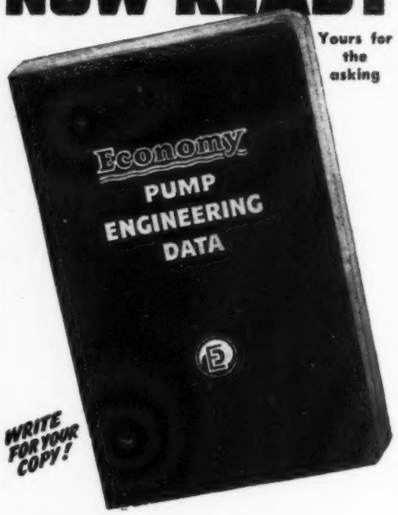
Write for Catalog Sheets

ARMSTRONG - BRAY & CO.

"The Belt Lacing People"

5338 Northwest Highway Chicago 30, U.S.A.

NOW READY



Yours for the asking

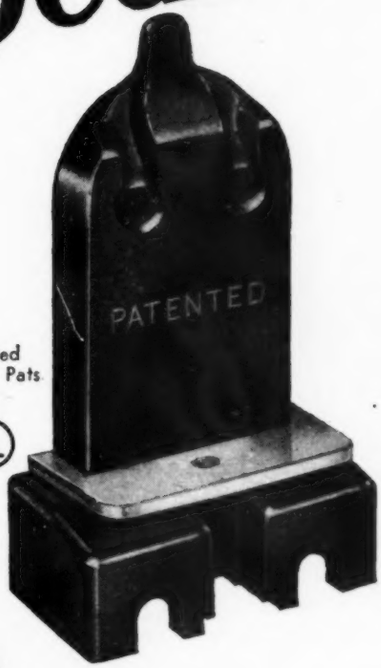
A timely contribution to industry—416 pages of factual data just when vital postwar pump problems require authentic facts, sound experience and advanced engineering practice.

Here, under one cover, are hundreds of handy tables and diagrams you need every day. Revised, improved and new data governing the correct layout and installation of sewage, drainage, processing, heating systems, etc. Describes clearly and exactly the way to do the job right.

Indispensable to Engineers, Plant Managers, Maintenance Men, etc. Sent free to Executives in response to their requests on business letterheads. Otherwise, $2 per copy.

ECONOMY PUMPS, INC.
HAMILTON, OHIO, U. S. A.

...beatables



Patented
Other Pats
Pend.

Pat. Nos.
2200443
2228210

Lloyd Flex-Loc lampholder Automatic Starter

FLEX-LOC Lamp Holder

FLEXIBLE — Automatic — self-adjusting to variations in lengths of lamps or spacing of mounting holes. Engineered to fit all standard spacings.

AUTOMATIC LOCK is positive. No need for extra locking devices. Lamp cannot fall out. Contacts cannot loosen.

EASY insertion and removal. No twisting. No turning. No fussing to seat lamp in holder. FLEX-LOC does the work automatically. As lamp pins slide up to terminal holes, holder is flexed outward. As pins enter holes, holder snaps inward, internal spring returning to normal.

PERFECT ELECTRICAL CONTACT — Newly designed, patented terminals grip BOTH sides of lamp pins . . . make sure and positive contact.

Listed and Approved by Underwriters' Laboratories Inc.

Automatic Starter

Positively cuts out deactivated, flickering, blinking lamps.

When trouble is detected the starter automatically cuts off current to the ballast and lamp.

Gives long life to ballast because defective lamp is locked out. Prevents overheating.

When Lloyd AUTOMATIC locks out defective lamp—turn off the current—remove defective lamp—put in a new lamp. Allow at least one minute to make above changes. Turn on current. The starter automatically lights the new lamp.

The life of the AUTOMATIC starter is many times greater than that of the average lamp.

It saves maintenance costs and power consumption, protects and insures longer life to ballast and lamp.

Certified by Electrical Testing Lab., Spec. 6

Lloyd Policy Insures Quality

LLOYD PRODUCTS CO.

Providence 5, R. I.

Branch Offices and Warehouses in 27 Leading Cities

This COULD *Happen to* YOU

It Needn't . . .

if you have smooth, hard and tough serviceable floors.

The easiest way for you to get such floors, trucking aisles and platforms, is to repair or completely resurface them with STONHARD RESURFACER.

This durable material is extra tough, shock-proof and fire-resistant. It is built to withstand the heaviest trucking and traffic. No cutting or ripping up of the old surface is necessary when making repairs or resufacing with STONHARD RESURFACER.

Easily applied by unskilled labor over concrete, wood, brick or composition, STONHARD RESURFACER allows areas repaired or resurfaced to be used in 36 hours or less.

STONHARD RESURFACER is sold on a "Satisfaction or No Charge" basis. Send the coupon below for a trial drum or more information.

Stonhard Company
806 Terminal Commerce Bldg., Philadelphia 8, Pa.

☐ Send us a trial drum of STONHARD RESURFACER.
☐ Send us more information on your trial offer.

FIRM .....
MR. ..... TITLE.....
ADDRESS .....
CITY ..... ZONE..... STATE.....

STONHARD COMPANY

Building Maintenance Materials • Since 1922

806 Terminal Commerce Bldg. Philadelphia 8, Pa.

gear our operations to sharp post-war competition. Today our materials are costing us more than they ever have before. More important, our work productivity per man is at the lowest mark ever.

The wage rates we shall be able to pay will, after reconversion is completed and we have reached volume production, depend entirely on these two questions: Whether we are able to keep other costs down while obtaining better productivity from our employees.

Looking Ahead

Our No. 1 job today is to get to work making cars and trucks—as many as we can, better cars and trucks than our competitors' cars and trucks, at lower prices. We have been doing everything we can to get into maximum production and stay there. The people of this country want cars and they want jobs. If we can carry through our production plans we can do more than our share in giving them both.

To do this will require the best efforts of all of us in the Ford Motor Company working together. As we increase our efficiency we can give our customers still better cars and trucks at still lower cost, we can pay higher wages, and we can plow more earned capital back into improved operations to make us still more efficient.

The company agreed in 1941 to the union shop and check-off provisions. Its purpose in so doing was not only to give the union the benefit of membership and financial security, but also to eliminate a great deal of friction, dispute, and downright industrial strife.

In return, the company was assured by union representatives that it would receive greater security and that disturbances of the type then prevalent in other plants would be avoided.

That contract, with its union shop and check-off provisions, was hailed by union leaders and others throughout the country as one of the most progressive steps ever taken by union and management toward industrial peace.

Our experiences in the last four years have substantially dispelled this hope. The peaceful relations have not materialized. The experiment has been an unhappy one. The record shows, for example, 773 work stoppages since the signing of that contract in 1941.

During this period, the cost to the company of maintaining the check-off system has been huge. Last year, for example, the company spent $2,814,078.36 in the Dearborn area alone to collect these dues and fees, and to pay more than 1000 union men in the company's plants who spent all or part of

YOU'LL *Get it Together...* FASTER!

with

Thor PORTABLE ELECTRIC SCREW DRIVERS and NUT SETTERS

An accurate, adjustable clutch on this Thor Model ULTW electric screw driver provides positive tension control to set screws to exact tightness.

You can drive screws and nuts at top speed, confident that they will be driven to exact and uniform tightness with complete safety to men, material and fastener when you use Thor Universal Electric Screwdrivers and Nut Setters. With Thor's *complete line* of power units and attachments you can be sure of tools with precisely the right speed, power and control to do your assembly jobs better and quicker.

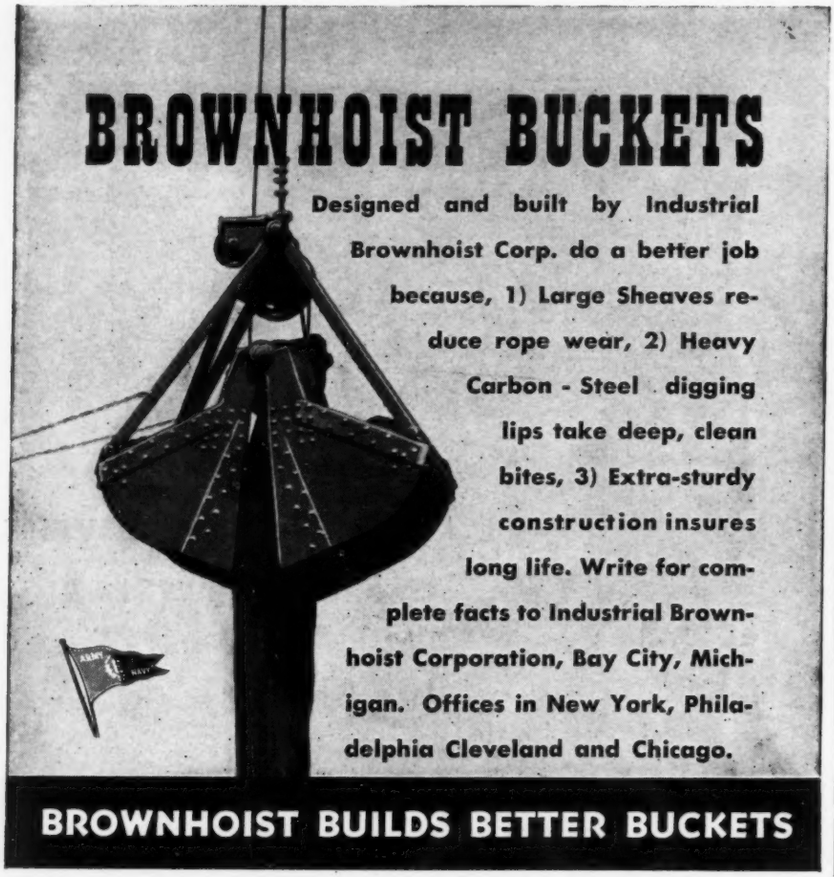
Whatever the size, type, position or tension requirements of your screw driving and nut setting operations—call today on your nearby Thor electric tool distributor. *Thor engineers serving him—and you—have never failed to solve any such assembly problem yet presented!* They'll be glad to check on *yours* . . . without obligation.

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois

BIRMINGHAM BOSTON BUFFALO CLEVELAND DETROIT LOS ANGELES MILWAUKEE NEW YORK
PHILADELPHIA PITTSBURGH ST. LOUIS SALT LAKE CITY SAN FRANCISCO TORONTO, CANADA LONDON, ENGLAND

Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS


BROWNHOIST BUCKETS
Designed and built by Industrial Brownhoist Corp. do a better job because, 1) Large Sheaves reduce rope wear, 2) Heavy Carbon - Steel digging lips take deep, clean bites, 3) Extra-sturdy construction insures long life. Write for complete facts to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia Cleveland and Chicago.
BROWNHOIST BUILDS BETTER BUCKETS

"HARD-HITTING Softie"
...HEALS ITSELF
TESTED! A 6-inch cylinder of Flex-O-Cryst pressed under 10-ton pressure into sheet (1/8 inch thick) slowly returns to original shape and size.

NEW PLASTIC DISCOVERY — Flex-O-Cryst — used in NUPLA Hammers is more durable than rawhide because it does not curl or deform. *Unlike rubber*, it is not affected by oil or gasoline. Will not rebound or sting. *Unlike many plastic materials*, it does not chip or crack.

That's why NUPLA Hammers are unlike any hammer you've ever seen. They hit hard effective blows without marring, cutting or battering.

NUPLA Hammer is a craftsman's tool. Has a straight grain hickory handle locked in place; finely finished. Write for name of local dealer or jobber . . . SOLD BY WHOLESALERS EVERYWHERE.

NEW PLASTIC CORP. 1017 N. Sycamore Ave., Los Angeles 38, Calif.

A NUPLA HAMMER FOR EVERY JOB
5 SIZES—29 WEIGHTS

MIGHTY *but Gentle* **NUPLA** PLASTIC HAMMERS

their time handling union business.

From August, 1941, through October, 1945, the company collected for the union in dues, initiation fees, and special assessments a total of $7,799,924.65.

Last year the union's income through the check-off system was $2,050,563.71.

The result has been that the union has had membership and financial security, but the company has had no compensating security. This has become so serious that unless some provision can be arrived at in our negotiations to require the union to recognize and fulfill a responsibility of its own, the very future of the Ford Motor Company is at stake.

The company accepts the principle of union membership for its employees and collective bargaining with union representatives. But if we are to reach production efficiency essential to our common objectives, we must insist upon guarantees by the union against work stoppages and losses in productivity.

Our record since 1941 indicates that these guarantees have not in fact been provided by the union shop and check-off. We therefore propose that you come to our forthcoming negotiations prepared to give us some better plan for giving the company the same degree of security as we have given the union itself.

Contract Demand

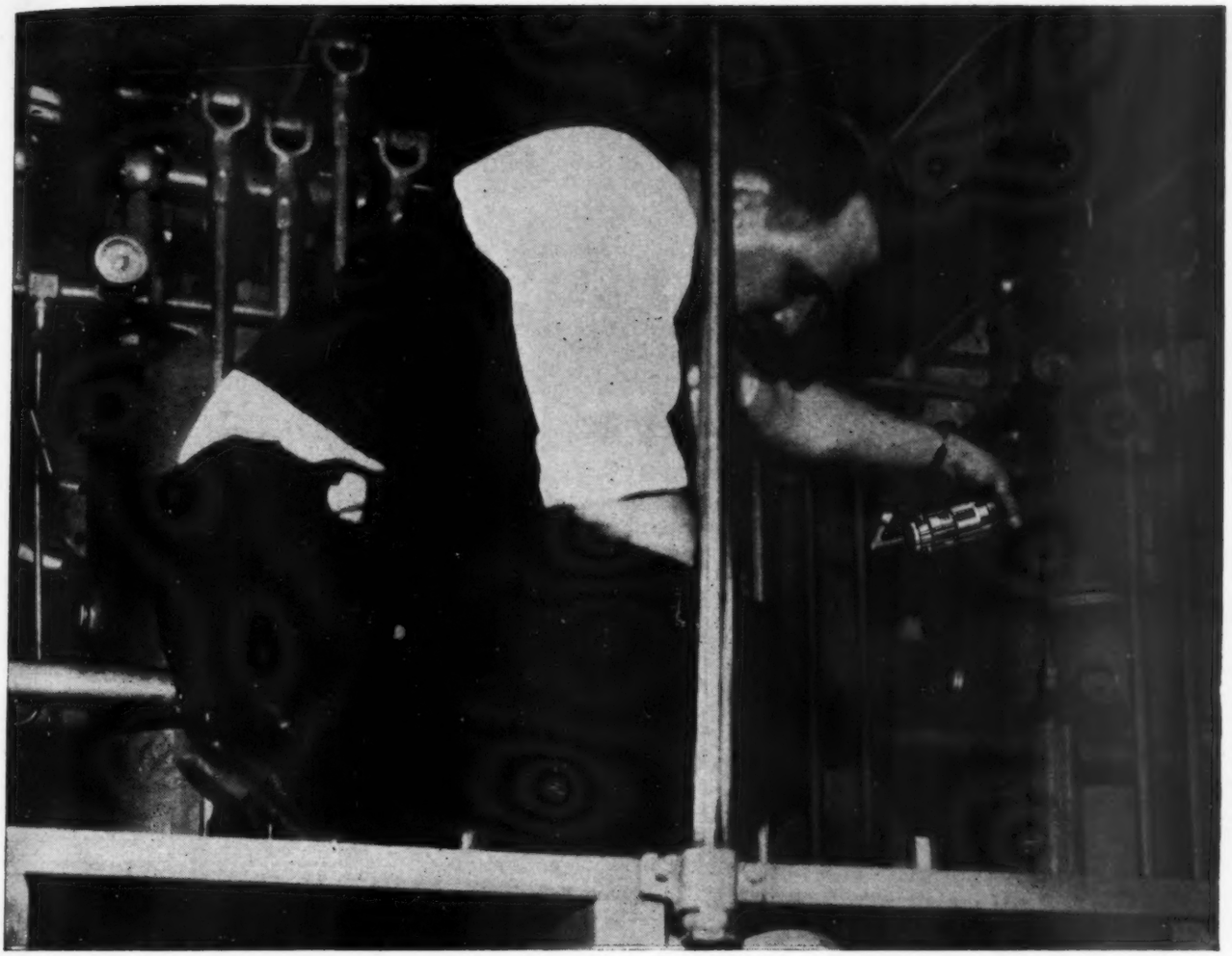
1. The company proposes that the contract be rewritten and re-arranged so that all subjects covered will be treated in logical and cohesive order.

2. The company proposes that Section 1 be rewritten to describe more accurately the exclusions from the unit coming under the jurisdiction of the CIO and to exclude specifically the inspection, time, medical, first aid, labor relations, and veterans departments, production clerks, shop clerks, scheduling clerks, executive car drivers, and employees in the offices of Gate 4 of the Rouge plant and in the Ford airport.

A clause shall be included providing that the union will not attempt to organize or accept into membership employees in the excluded categories and shall obtain and deliver to the company commitments from the Congress of Industrial Organizations to the effect that it will not permit any union chartered by it to organize or accept into membership employees in such categories.

A clause shall be included that neither the company nor the union will interfere with, restrain, or coerce employees either to join or refrain from joining the union.

3. The company proposes that the union present a plan, to be incorporated in the agreement, which will assure com-



He's reading the "Blood Pressure" of a giant Diesel engine

. . . with the help of Veeder-Root COUNTROL

This unique instrument is designed to help power engineers and maintenance men keep Diesel engines running at peak efficiency. Simply by a "twist of the wrist," the operator obtains an accurate maximum pressure reading on the indicator's clear, easy-to-read Veeder-Root Counting Device.

The instrument's operation is based on the principle of balancing the maximum cylinder pressure by the force of a precision spring, and then measuring deflection of the spring. Cylinder pressure acts against the bottom of a ball piston which is held on its seat by the force of this spring. Now, spring-tension is reduced by turning the indicator handle until cylinder pressure offsets spring pressure. At this instant the handle locks in position and the operator can read—directly, in pounds per square inch—the Veeder-Root Counting Device to which the handle is geared. No mistakes can be made. No adjustments or settings are needed to compensate. Accurate readings up to 1700 pounds per square inch can be taken instantly and directly from the Veeder-Root Counter... on any type of Diesel, at any speed and rate of pressure rise.

This is an interesting instance of the infinite ways in which Veeder-Root Counting Devices can be designed and built into all types of products, as integral parts, to help those products deliver a distinctive, exclusive service. And it would be interesting, too, to see what Veeder-Root "*Count*rol" might do to add new utility *and marketability* to *your* products, present or projected—or both. Write.

The Counting House of Industry

VEEDER-ROOT INC.

Hartford 2, Connecticut

In Canada: Veeder-Root of Canada, Ltd., Montreal
In England: Veeder-Root Ltd. (New address on request)

MOVE MEN, MATERIAL and MERCHANDISE safely, surely and at low cost

THE "Sedgwick" WAY

PROPERLY PLANNED elevator and dumb waiter installations help reduce costs by moving men, material and merchandise up and down better and faster.

Sedgwick Electric Freight Elevators, for example, are specially designed to lift heavy loads—increase efficiency—simplify installation, service, repair and maintenance. They have many advantages:

1. Worm geared V-groove traction machines
2. *Internal helical gearing*
3. Self-aligning motor mounting
4. Special, heavy duty motors
5. Low carbon steel gears and shafting
6. Anti-friction bearings

For more than 50 years Sedgwick Freight and Passenger Elevators and Electric and Hand Power Dumb Waiters have helped many manufacturers solve cost reduction problems by solving some of their "man" handling and materials handling problems. Chances are we can solve yours.

So if you are stymied by perplexing lifting and lowering problems—*tell us about them.* Our engineering staff is at your service now—ready to show you how Sedgwick Freight Elevators (and other Sedgwick equipment) reduce costs by moving men, material and merchandise up and down better and faster.

Sedgwick
MACHINE WORKS
138 W. 15th St., New York 11, N.Y.
ELEVATORS SPECIAL LIFTS
HOISTS DUMB WAITERS

pany security through exercise of union responsibility, which the union shop and check-off have not provided; further, that such plan provide effective guarantees against work stoppages and for increased productivity on the part of its members.

4. The company proposes an extension and clarification of the clauses covering the prerogatives of management, including an express understanding that all rights not specifically modified in the contract are retained by the company.

5. The company proposes that the number of union committee men be greatly reduced and be paid by the union; and that specific provision be made for adjustments in the amount of union representations in the event of major changes in employment levels.

6. The company proposes that an employee first present his grievance verbally to his foreman, with an opportunity for the foreman to adjust it, before calling upon the union to intervene on his behalf.

7. The company proposes that the grievance procedure be modified to provide that failing settlement in the lower levels, the grievance shall be negotiated by the union building committee with a management building committee; and failing settlement at that step shall be negotiated by the union plant committee with the management plant committee; and failing settlement at that step may be appealed directly to the umpire. In plants which comprise one bargaining unit the building committee step would, of course, be omitted.

8. The company proposes that preferential seniority of union committeemen and officers be restricted to permanent layoffs.

9. The company proposes that the period of temporary layoff for purposes of layoff and recall by operations be defined as 90 days rather than 30 days.

10. The company proposes that the phrase "better jobs with equal pay" be eliminated from the definition of promotions contained in Section 51.

11. The company proposes that all employees transferred to jobs in excluded categories shall be deemed to continue to accumulate seniority in the unit from which they were transferred.

12. The company proposes that the provision in Section 38 that no temporary demotions or transfers from excluded classifications will be made within 60 days prior to layoffs be eliminated.

13. The company proposes that the

ATTENTION MANUFACTURERS!

If you have rats or mice, and want to be rid of them without the worry that use of poison involves, send your order at once.

We have prepared a bait that contains red squill, a drug from the Mediterranean which is harmless to humans, cats, or dogs, but has the special qualities that mean *DEATH TO THESE RODENTS.*

Our R. C. Baits, baked in cookie form, are readily eaten by rats and mice, and have been used successfully with great satisfaction. All you do is scatter our R.C. Baits in infested areas.

No. F 1501— 100 baits—$4.00
No. F 1502— 250 baits— 7.50
No. F. 1503— 500 baits—12.50
No. F 1504—1000 baits—20.00

"It's worth the price because it does the work without danger to human life."

Your check or purchase order will assure you prompt delivery. We pay all shipping charges except on C.O.D. orders.

RODENT CONTROL CO.
220 Broadway, New York 7, N. Y.

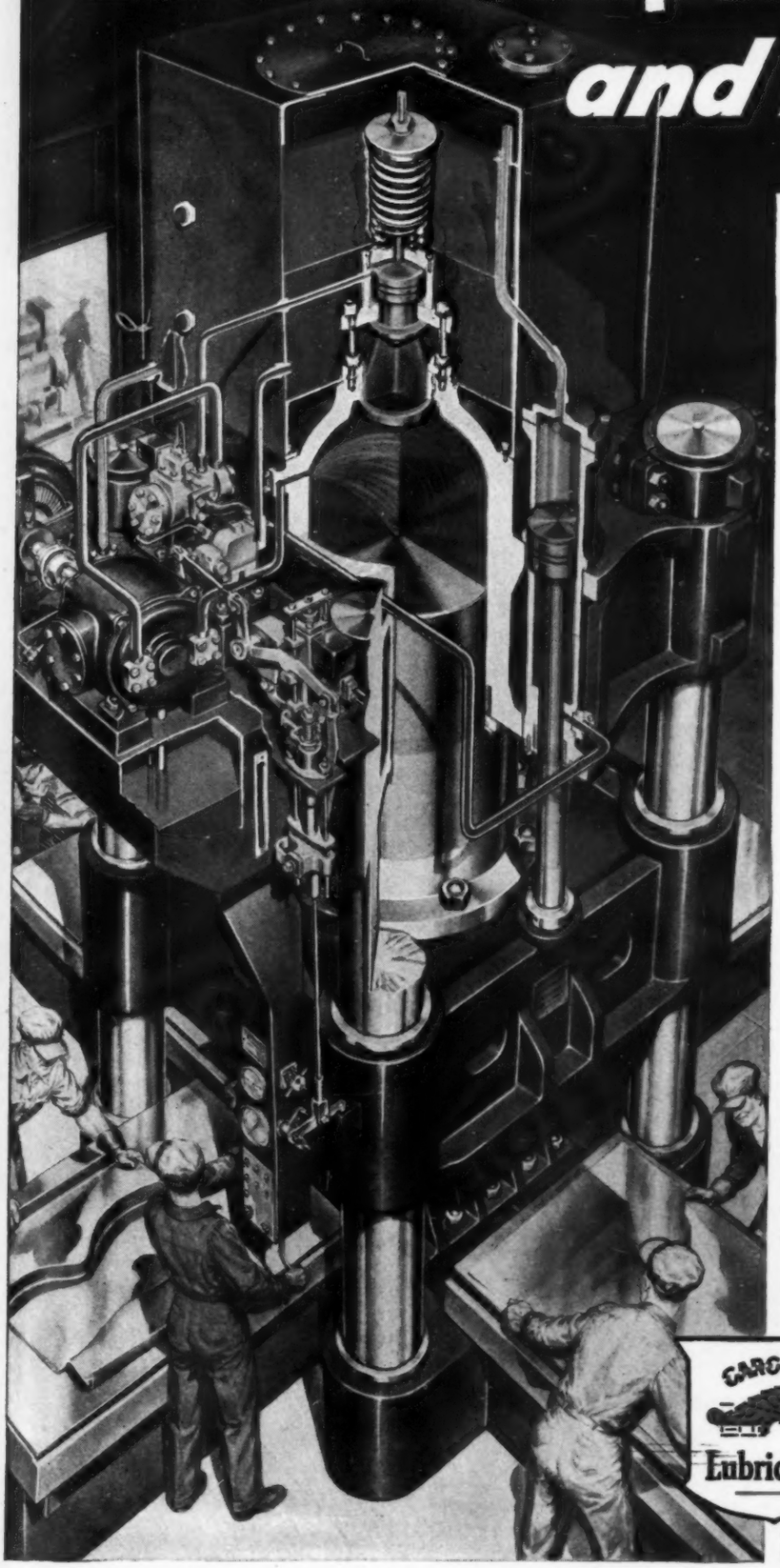
HOW TO BUILD
LAMP ANNUNCIATORS
Kirkland Bulls-I-Units are ideal for this purpose. Just provide the proper size holes in the panel, then insert the Kirkland units and lock into place. Many different units to choose from. Assembly is then ready for installation. Connect incoming wires and place in service. Typical unit illustrated above made with T2 units.

KIRKLAND Pioneer
INDICATING LAMPS

TYPE T2 UNIT

Small and modern, molded of bakelite. For use with slide-base switchboard bulb (24 volts, 0.038 Max. Amp) with resistor on 120-220-440 volts. Overall dia. Lens-Cap ¾".
LIST PRICE (less bulb) 70¢.
Write Today for Catalogue
Where Quality is the Foremost Consideration
The H. R. KIRKLAND CO., Morristown, N. J.

Here Oil Shapes Steel... and Profits!



THIS huge hydraulic press packs a ten-million-pound wallop to stamp out parts for new cars. It's cut open here to show the importance of correct lubrication to continuous low-cost production.

Inside this giant, oil plays a dual role — as a medium to transmit power and as a lubricant to protect parts from wear. Knowing this, Socony-Vacuum has developed special oils to keep this giant on the job — longer — at less cost.

Every industrial plant has its own individual needs.

Through close cooperation with machinery builders, Socony-Vacuum is able to produce the right oil for every part of every machine made. Working with plant operators in every industry, our lubrication specialists have developed new methods to apply these products for best results — steady output, low power loss and low maintenance and lubrication costs.

All this adds up to greater profits.

SOCONY-VACUUM OIL CO., INC. and Affiliates: Magnolia Petroleum Company, General Petroleum Corp. of Calif.

The press and auxiliary devices shown are covered by patents and pending applications owned or controlled by Birdsboro Steel Foundry & Machine Co.

Call in SOCONY-VACUUM for this Correct Lubrication Program

- Lubrication Study of Your Entire Plant
- Recommendations to Improve Lubrication
- Lubrication Schedules and Controls
- Skilled Engineering Counsel
- Progress Reports of Benefits Obtained

GARGOYLE Lubricants

Niagara Aero After Cooler Protects Air Processes from Moisture Damage

Industries requiring dry compressed air need the Niagara Aero After Cooler. It provides cleaner, drier air for pneumatic tools, spray guns, sand and shot blast equipment, air cleaning nozzles and situations where air is introduced into materials in process.

The Niagara Aero After Cooler is based on the evaporative cooling principle. It does not consume cooling water and thus pays for itself quickly from savings in water bills. The patented "Balanced Wet Bulb" method assures the lowest air temperature, and controls exactly the jacket water temperature.

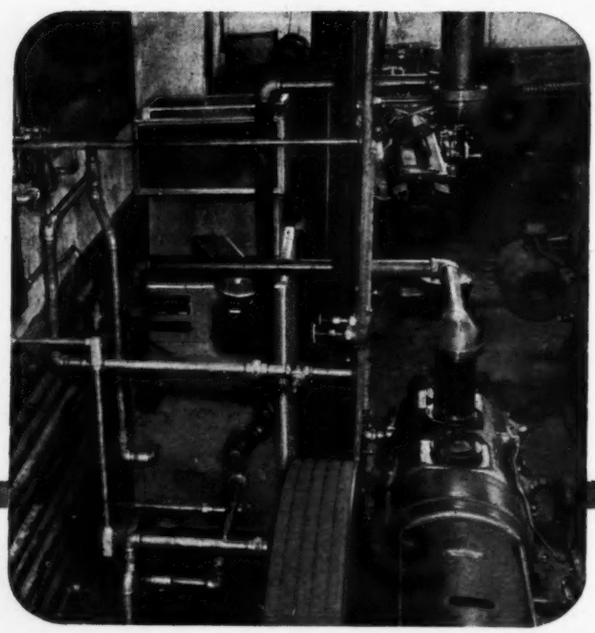
Write for Niagara Bulletins 96 and 98 for further information. Protection of air tools from moisture damages and saving in repairs makes the Niagara Aero After Cooler worth investigating.

NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air Engineering

DEPT. FMM-16, 6 E. 45th St., NEW YORK 17, N. Y.

Field Engineering Offices in Principal Cities



INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

layoff provisions in the contract be modified to provide expressly that under certain circumstances relating to the productive efficiency and effective operation of the plants, seniority shall be a secondary consideration in selecting employees to be laid off, and that the primary considerations shall be knowledge, experience, and ability.

14. The company proposes that demotions shall be made first on the basis of merit and ability, and where these are equal, on seniority.

15. The company proposes that seniority lists shall be made up every 90 days rather than every 30 days.

16. The company proposes that Section 54 relating to loss of seniority be modified to provide that seniority shall be broken by:

a. Over-staying a leave of absence or violation of the provisions relating to leaves of absence.

b. Twelve months' consecutive unemployment.

The company also proposes that union approval of the settlement shall not be prerequisite to loss of seniority in connection with settlement on account of total disability.

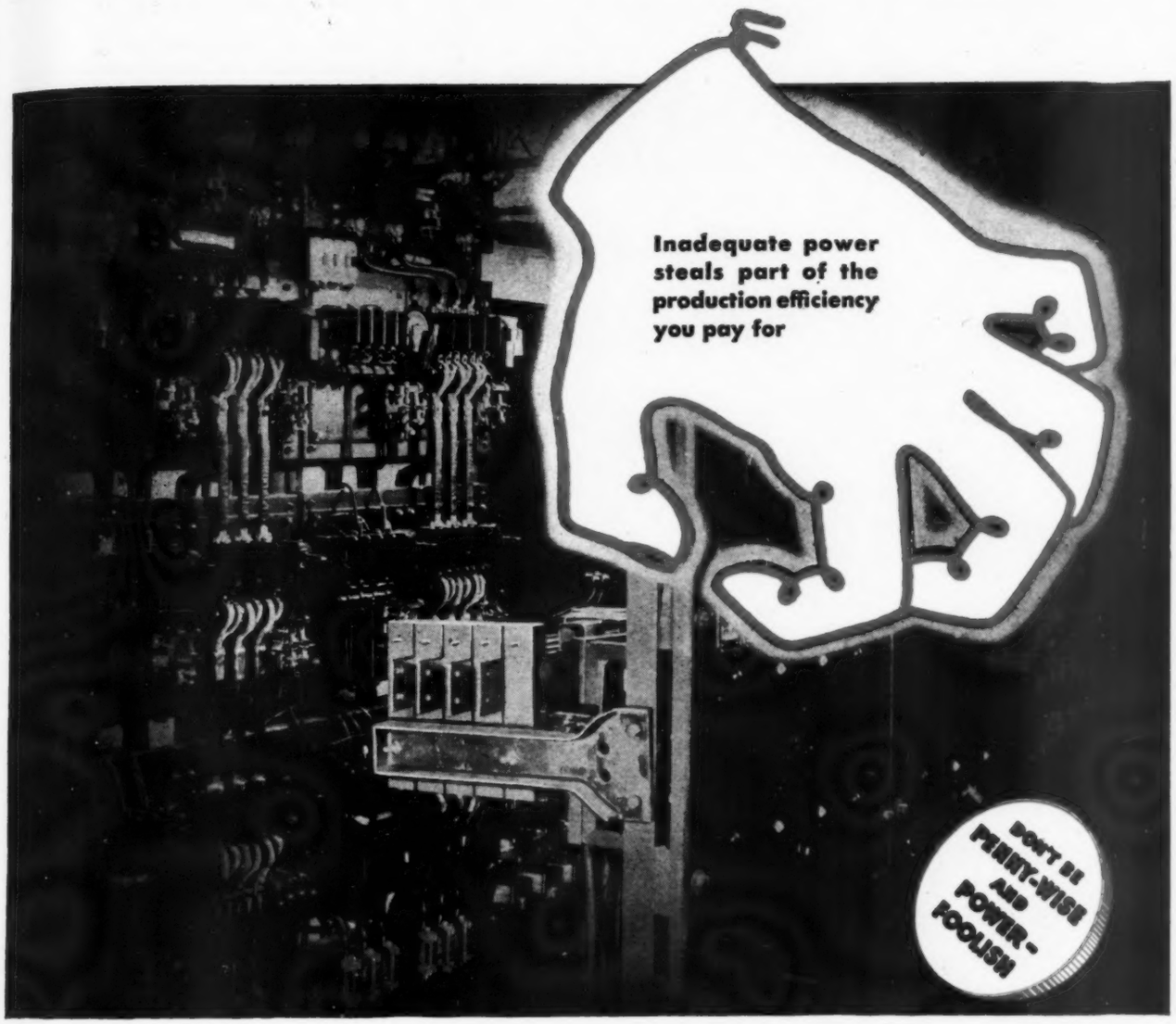
17. With respect to leaves of absence, the company proposes a specific provision that leaves shall be granted only if approved both by the foreman and the employment office; that only leaves of absence for emergency reasons shall be granted during times when the employee's services are urgently required by the company; that leaves of absence for personal reasons shall in any event be permissive rather than compulsory; and that employees shall not work in any other position, including self-employment, unless agreed to by the company, during the leave period.

18. The company proposes that Section 58 relating to sick-leave be revised to include a requirement that the company be notified of the employee's illness within a definite and a reasonably short time.

19. The company proposes that Section 61 relating to leaves upon union request be amended to limit the number of employees who can be granted such leaves to one for every 1000 employees on the payroll in categories covered by the union agreement.

20. The company proposes a section which will effectively prevent either strikes or other interferences with production on the part of the union and the employees for the duration of the contract.

21. The company proposes a pro-



Backward wiring handicaps advanced equipment

...Wire ahead

DON'T HOBBLE new, improved equipment for the sake of saving a few extra dollars worth of wiring.

Remember, to get peak efficiency from postwar production equipment wiring must come first—foresighted wiring to provide for greatly expanded power needs to come.

Check your wiring plans now. Avoid costly alteration shutdowns later. Call in your consulting or plant power engineer, electrical contractor or power salesman. Hear what *they* say about the wisdom of soundly planned wiring and service equipment. Anaconda Wire & Cable Company, Subsidiary of Anaconda Copper Mining Company. General Offices: 25 Broadway, New York City 4. Chicago Office: 20 North Wacker Drive 6. Sales Offices in Principal Cities.

✓ Check your wiring plans before they check you!

ANACONDA **ANACONDA WIRE & CABLE COMPANY**

OTC
MAINTENANCE
TOOLS
HELP
to relieve
LABOR SHORTAGE
Save hours of time and lots of hard work in removing and replacing gears, bearings, sleeves, wheels, shafts and other close-fitting parts. OTC TOOLS are EASY to handle, SAFE to use, FAST-working. They avoid damage to costly and hard-to-get parts. Approved by Timken, M-R-C, Hyatt, SKF, New Departure.
The OTC PULLING SYSTEM includes 7 sizes of GRIPOMATIC PULLERS and 4 sizes of PUSH-PULLERS, with Attachments and Adaptors to adapt them to countless maintenance and repair operations; also heavy duty Box Wrenches, big Striking Wrenches and Special Tools.
ASK YOUR SUPPLY HOUSE or write for helpful Illustrated Catalogue
OWATONNA TOOL CO.
363 CEDAR ST.
OWATONNA, MINN.

THEY SAY AND DO *(continued)*

vision whereby the union undertakes to reimburse the company for any damages it may suffer by reason of violations of the provisions prohibiting strikes and other interferences with production.

22. The company proposes an amendment to Section 64 of the present contract relating to bulletin boards to the effect that no notices shall be distributed or posted on company property by or on behalf of the employees or the union except on the duly authorized bulletin boards, with all notices to be approved and posted by the company. Willful violation of this provision shall be sufficient cause for the elimination of the bulletin boards.

23. With respect to Section 65 of the present contract relating to rules and regulations, the company proposes that a provision be added whereby the union agrees that its members will obey the rules and regulations of the company as published, and will recognize that the company has the right at any time to adopt reasonable rules and regulations not in conflict with the agreement.

24. The company proposes the elimination of Section 71 of the present contract. (*Editor's note:* Section 71 proposes the payment by the company of transportation fare and travel time for employees assigned to a plant away from the general locality of the plant in which he is usually employed.)

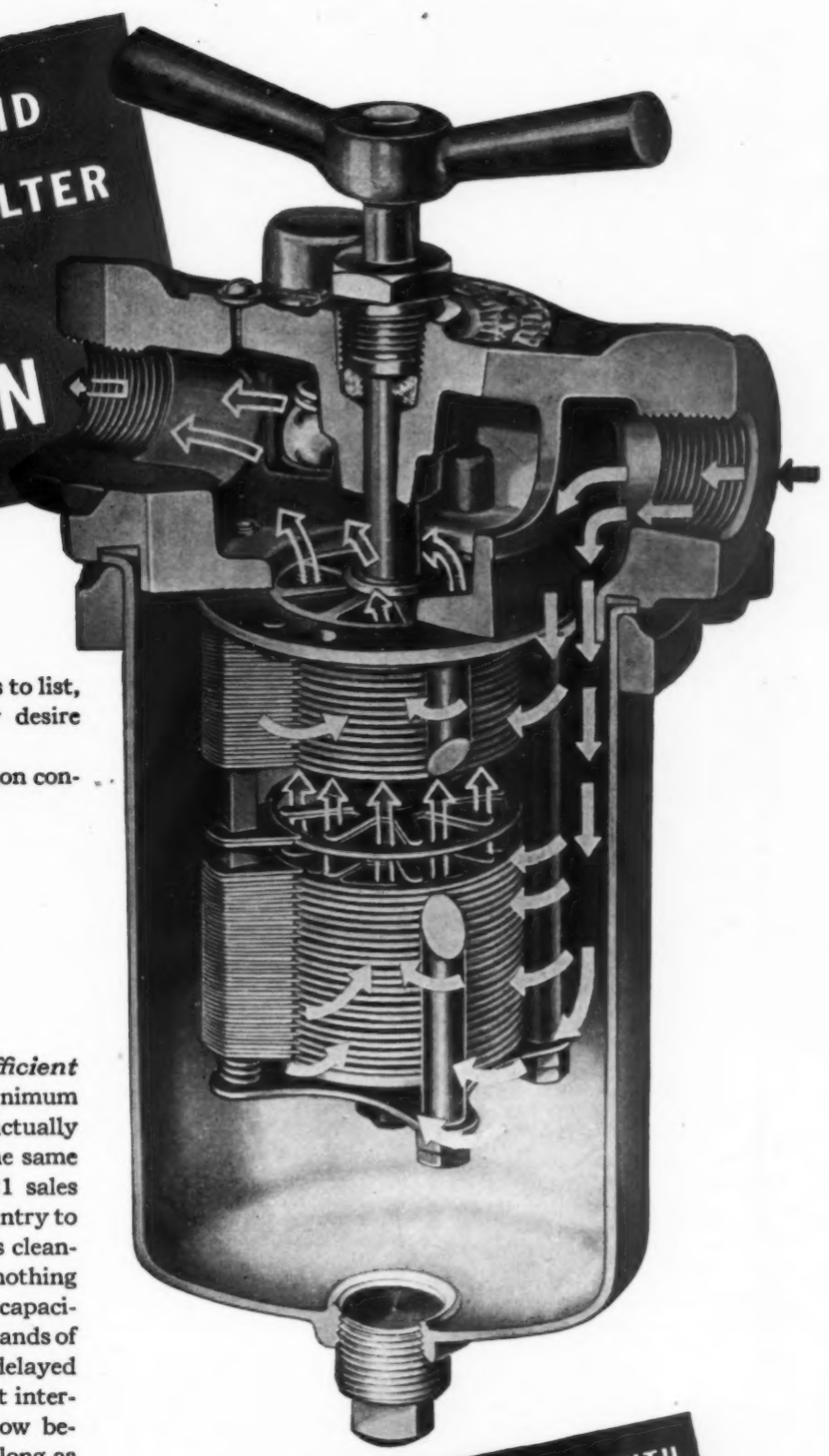
25. The company proposes a revision of Section 72 in the present contract to provide specific and reasonable rules governing performance of production work by foremen, recognizing that foremen must be permitted to do such work as is necessary to the proper fulfillment of their supervisory duties and the maintenance of an even and uninterrupted flow of production.

26. The company proposes that Section 75 of the present contract be rewritten to make the contract as amended in these negotiations terminable at the end of one year on notice by either party. (*Editor's note:* Only 30 days' notice is required now.)

27. The company proposes a clause providing the umpire (adjudicating a dispute) shall not have jurisdiction to decide any question where, by reason of the provisions of applicable statutes or otherwise, the parties would not be fully protected from liability to third persons in following his decision.

28. The company proposes a clause providing that the umpire shall not have power to decide any question under this agreement within the exclusive prerogatives of the management,

WHAT YOU'VE SAID YOU WANT IN A FILTER YOU GET IN AN AUTO-KLEAN



WE asked a large number of manufacturers to list, in order of importance, the features they desire most in a fluid-cleaning device.

Here's what the men in charge of production considered most important:

1. Efficiency
2. Simplicity and compactness
3. Service from supplier
4. Ease of maintenance
5. Capacity
6. Continuous operation
7. Maintenance cost

Now consider the Cuno Auto-Klean. (1) It's *efficient*—positively stops all solids larger than minimum size specified. (2) It's simple and *compact*—actually smaller in size than other filters handling the same volume at equal porosity. (3) There are 21 sales engineering organizations throughout the country to provide service. (4) It's easy to maintain—is cleanable just by turning a handle, or by motor—nothing to replace or remove for cleaning. (5) Flow capacities range from a fraction of a gallon to thousands of gallons per minute. (6) Production is never delayed—the filter is continuously cleanable without interfering with flow. (7) Maintenance cost is low because the all-metal filter element will last as long as the equipment on which it is installed.

Cuno Auto-Klean—an all-metal, non-collapsible filter—is being used successfully on a variety of applications . . . from high-pressure to gravity-feed systems . . . from straining river water to filtering heaviest fuel oil.

You'll find filter selection information and specifications on the Cuno Auto-Klean in SWEET'S—or write us for Mechanical and Process Industries Catalog, Cuno Engineering Corporation, 615 South Vine Street, Meriden, Connecticut.

KEEP FLOW ON "GO" WITH

CUNO

THE "FILTER-FINE" STRAINER

HAVE YOU ADEQUATE BULK STORAGE FACILITIES?

N & F super-concrete stave bins provide adequate, handy and economical storage and gravity or conveyor discharge of any bulk material that will flow—

Coal, coke, cinders, sand, gravel, cement, clay, kaolin, alumina, magnesium, grains, soybeans, etc.

Low cost due to concrete stave construction.

Erection by trained crews.

Great strength due to interlocking of each super-concrete stave with six adjoining staves, with tightly drawn steel hoops over each stave. Any type conveyor conditions require.

If you have a bulk storage problem or want to feed coal direct to stokers from bins, get N & F 1946 catalog for particulars.

THE NEFF & FRY CO.
CAMDEN, OHIO

N & F special super-concrete stave that locks with six staves around it.

N & F
SUPER-CONCRETE
STAVE BINS

but shall, in rendering decisions, have due regard for such prerogatives and so construe the agreement that there will be no interference therewith except as they may be specifically conditioned by the agreement.

29. The company proposes an addition to Section 29 (17) of the present contract to provide that the union will not seek, or permit its members to seek, by any means other than the grievance procedure to bring about the settlement of any issue or dispute subject to the umpire's jurisdiction.

30. The company proposes that the call-in pay provision be amended to make it specifically understood that the company shall not be liable for call-in pay in the event of labor disputes occurring at plants of suppliers which cause interruptions in production in the company's plants. The clause should also contain explicit understandings that employees voluntarily absent at the time general notification is given of a shutdown or partial shutdown shall not be entitled to call-in pay; and that the company may avail itself of any employee to whom it is required to pay call-in pay in any type of work for the 4-hour period or any portion thereof at his regular rate.

31. With respect to the vacation plan, the company proposes that vacations be proportioned to the amount of work actually performed by the employee during the preceding year and that the 45-day allowance for absenteeism be reduced to 30 days.

•

Economic Background for Social Action

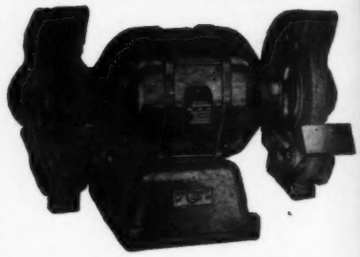
(Objectives of the National Association of Manufacturers for 1946 were outlined by Robert S. Wason, president of Manning, Maxwell & Moore, Inc., and newly elected president of NAM, in an address before NAM's recent "Golden Anniversary Congress of American Industry." Main portions of the Wason address are reproduced herewith, followed by an excerpt from one of the other speeches delivered before the industrial congress.)

Only under the American economic system can both freedom and real security be realized.

In 1946, your association will work for real and genuine security for every American in every year of his life. That security should begin at once with a good job at fair pay. Social security that begins at 65 and returns less than

BALDOR
BALL BEARING GRINDERS

BUILT FOR THE TOUGH JOBS



ASK FOR BULLETINS
ON COMPLETE LINE

BALDOR Grinder No. 8100. Built sturdy for heavy-duty, precision grinding. ½ h.p. Capacitor type, ball-bearing motor; 1700 r.p.m., 1 phase, 110 volts, 60 cy., 8" Aloxite Brand wheels . $54.00

BALDOR ELECTRIC COMPANY
4370 Duncan Ave., St. Louis 10, Mo.

Manufacturers of
ELECTRIC MOTORS
ELECTRIC MOTOR GRINDERS
BATTERY CHARGERS
FAST BATTERY CHARGERS
BATTERY TESTERS
Write for Bulletins

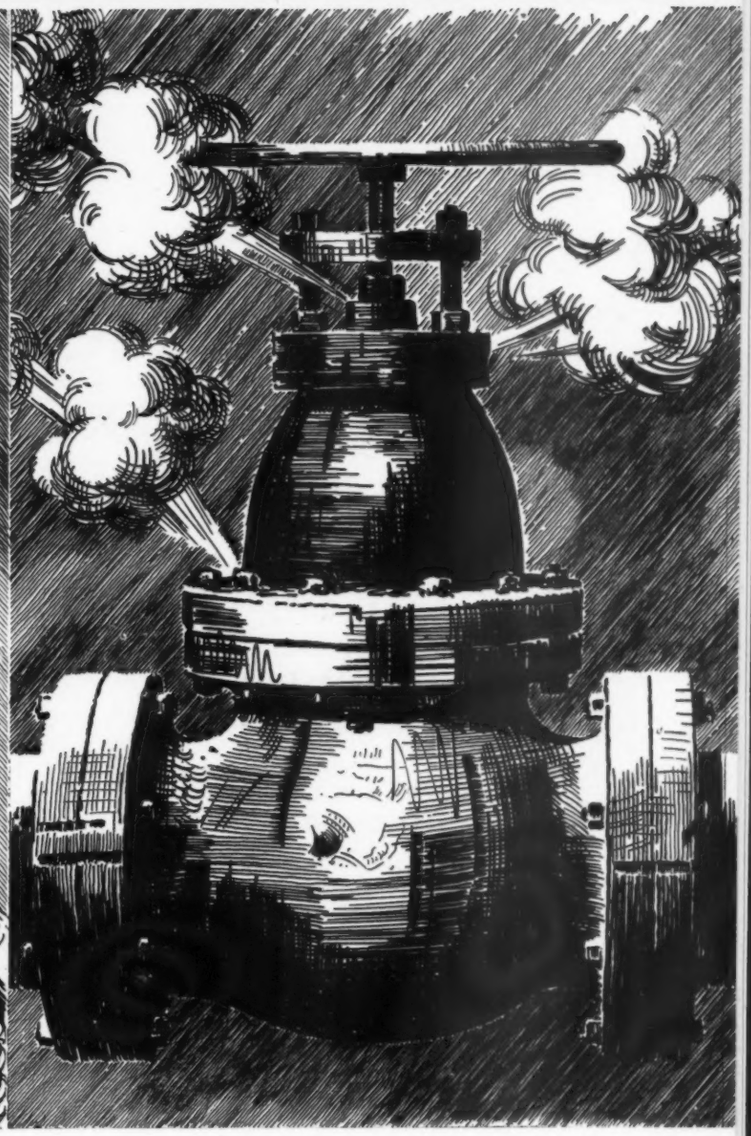
SAFETY CAN BE CAUGHT

Like almost every habit, the safety habit is "catching". It can be instilled through instruction — it should be encouraged by example.

Industries of all types which bestow Robbins Safety Awards to employees report that they set examples to other workers, stimulating the safety habit and establishing a goal for which they strive.

Throughout the country, companies large and small have effectively utilized Robbins Safety Awards to cut down accidents. Why not profit from their experience? The Robbins Company, creator of ideas in metal for over fifty years, will be happy to help you plan a Safety Award System for your plant.

The Robbins Co.
Ideas in Metal
ATTLEBORO, MASSACHUSETTS



Today's Robber Baron

THE ROBBER BARON of yesteryears was a piker. For sheer mass pilfering, consider the outworn valves in your plant today.

Valves already old before the war, yet not since replaced – valves worn beyond economical repair through war's overload – literally exact fortunes from industry today through failure at critical process points, through costly slowdowns, through constant pampering and repair. They are probably stealing from you right now.

This is the time to weed out costly and unreliable valves *before they cause trouble.* To replace them with the valves that give you the most dependable operation, at the lowest cost in the long run – Jenkins Valves. Jenkins' superior craftsmanship, materials and design, are your best insurance of ultimate economy with reliability. *But which valves should be replaced . . . ?*

Fortunately, Jenkins Engineers have evolved a foolproof plan, thoroughly tried in practice, to answer this question. Jenkins Bros. "VALVE RETIREMENT PLAN" spots the valves it is economical to replace. Not an advertising promotion, not "just another set of records" . . . but a sound service offered by Jenkins to solve your post-war valve problems. Invaluable to management, operating executives, engineers, yet does not cost you a penny! Mail coupon *now* for a free Jenkins Bros. "VALVE RETIREMENT PLAN" with valve record sheets.

Jenkins Bros., 80 White Street, New York 13; Bridgeport; Atlanta; Boston; Philadelphia; Chicago; San Francisco. Jenkins Bros., Ltd., Montreal; London.

LOOK FOR THIS JENKINS TRADE MARK DIAMOND MARK

Jenkins Bros

JENKINS VALVES

SINCE 1864

For every Industrial Engineering, Marine and Plumbing-heating Service . . . In Bronze, Iron, Cast Steel and Corrosion-resisting Alloys . . . 125 to 600 lbs. pressure.

Sold Through Reliable Industrial Distributors Everywhere

FREE! **TEAR IT OUT! SEND IT IN TODAY!**

RETURN COUPON

JENKINS BROS., 80 White Street, New York 13, N. Y.

Please send me without charge or obligation, the JENKINS BROS. "Valve Retirement Plan" with a set of valve record sheets.

Name .....

Company .....

Address .....

.....

WHERE DO LOW SELLING PRICES START?

Low selling prices and large volume are natural associates.

So are high selling prices and limited volume.

Labor is just like management—it has something to sell—its ability to produce.

When labor says "pay me more money", without saying "we'll produce more" labor's Sales Department is killing off its own market.

But if labor would say "let us produce more, by working together on plans and methods and materials—then you pay us accordingly", that's a different story.

High selling prices, boosted by labor rates, restrict sales and hurt everybody.

Low selling prices, held down by increased production, broaden markets and help everybody.

It benefits neither labor nor management to scramble for a bigger share of dollars that are never earned.

And dollars are earned only by making profitable sales.

Geo. D. Trundle Jr.
President

THE TRUNDLE ENGINEERING COMPANY

Brings to Industry and Business

26 Years **OF CONSULTING MANAGEMENT ENGINEERING EXPERIENCE**

GENERAL OFFICES • CLEVELAND • BULKLEY BUILDING

CHICAGO
City National Bank Bldg., 208 S. La Salle St.

NEW YORK
Graybar Bldg., 420 Lexington Ave.

a man's subsistence in his old age is a delusion to all who work.

If permitted, industry will encourage and assist the worker to build his own security out of savings from his own production. Industry must work to regularize jobs for employees and to increase workmen's security by widening the margin between the income he receives and the living costs he pays.

Industry will cooperate with agriculture, the distributing organizations, and the personal services to assist the same essential result in other segments of the economy.

True security comes from the production of goods and services. It can always be obtained by producing goods which the public wants at prices the public is willing to pay. This production can be assured through competition and free markets and protection of incentive to work and produce. It is this production that provides purchasing power to buy the produced goods. The government can pump wage increases into the economy, but unless production of goods is created for the wages paid, the result is only inflation of money and lack of security.

Cooperation Essential

In 1946, your association will work for fair working conditions and the utmost security of present jobs and income. It will plan boldly and fight valiantly to obtain full employment. More jobs *can* be created. Working conditions *can* be further improved. Prices to the consumer *can* be lowered. The standard of living *can* be raised. Only full production is needed to achieve these essential results. . .

In 1946, your association will continue to cooperate with labor and to seek equal rights for employers with employees.

At the Labor-Management Conference, just adjourned, Ira Mosher, your president, and your representatives in the NAM, achieved every success that was possible within the narrow agenda agreed upon by the conferees and at the request of President Truman.

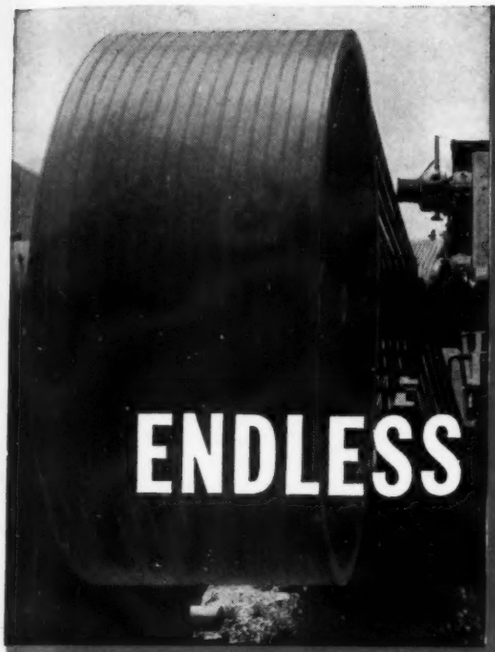
The public gains were limited by present laws.

Violence was not ruled out because violence is legalized by a Supreme Court decision.

Injunctions against labor unions were not discussed because, under the Norris-LaGuardia Act, labor cannot be enjoined.

Agreements on wage rates were not achieved because wage rates are based on your individual costs and vary with your industry and locality.

Agreement on labor's claim to par-



Gilmer

ENDLESS MULTIPLE V-BELTS

built for Power and Endurance

Whether your V-Belt drives call for a few or many belts, you can count on steady, dependable performance when tough, firm gripping, well-matched Gilmer V-Belts pull the load. And regardless of the length, power or speed of the drives, you can obtain the right belts to fit them . . . for Gilmer has the largest assortment of V-mould sizes in the world.

The special design and extra sturdy construction of Gilmer Multiple V-Belts assure maximum life and economy. And the Gilmer process of precision moulding provides "matched" lengths to within very small tolerances.

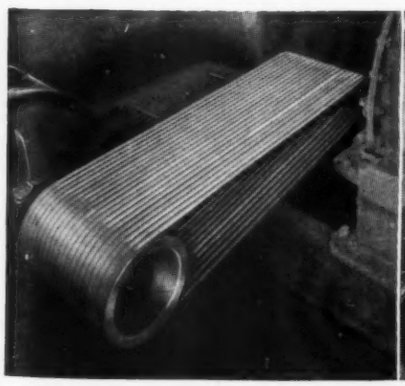
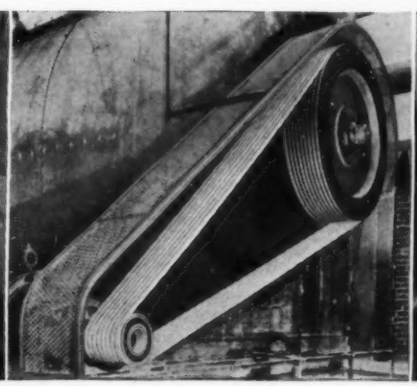
Gilmer also manufactures FHP V-Belts in a wide range of sizes to meet practically every application. When desired, any Gilmer V-Belt will be supplied specially treated to withstand conditions of excessive oil, heat, static, etc.

Write for a FREE copy of the Gilmer Guide, the most complete V-Belt catalog ever published. It contains valuable data that will prove helpful to every power plant engineer.

There are Gilmer Belts for every power transmission need

L. H. GILMER COMPANY
Tacony, Philadelphia 35, Pa.
Division of United States Rubber Company

Gilmer BELTS

What to use . . .

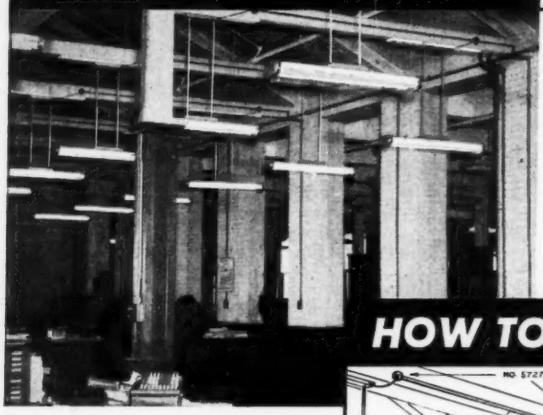
for convenience, economy, efficiency . . . in the installation of modern lighting systems, whether incandescent, fluorescent or newly developed light sources are specified.

WIREMOLD *surface*

METAL RACEWAYS

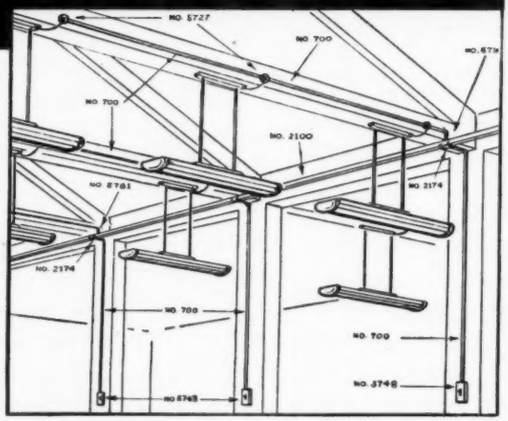
A complete series of basic surface raceway wiring systems . . . each with its own range of installation fittings . . . interconnectable one with another and with already installed wiring.

WHERE TO USE IT . . .



In this photograph is shown a typical use of Wiremold 2100 and 700 raceways with their installation fittings in wiring a building of mill type construction for fluorescent lighting units. Note the wide adaptability of Wiremold in handling a difficult ceiling installation and the convenient arrangement of switch controls on the building columns.

HOW TO USE IT . . .



Diagrammatic drawing shows the fittings used in this type of installation and emphasizes the interconnectability between the different sizes of raceway, which is an important feature of Wiremold. By using the various sizes of Wiremold raceways, interconnecting with each other and with existing wiring installed in the building, it is possible to plan a complete wiring layout from panelboxes to outlets with maximum economy in material and in time of installation. Write to The Wiremold Company, Hartford 10, Conn., for a copy of the Wiremold Catalog and Wiring Guide #16A and Engineering Data Sheets covering this type of installation.

THE WIREMOLD COMPANY
HARTFORD 10, CONN.

ELECTRICAL MAINTENANCE MEN

Wiremold Engineering Data Sheets and other literature are designed to help you solve wiring problems. If you are not receiving this literature, send us your name TODAY

NEMA **KNOW YOUR WIREMOLD**

BUSINESS BUILDER IN TOMORROW'S MARKET FOR ADEQUATE WIRING

ARMY E NAVY

ticipation in industry's profits was not obtained because labor shares no losses and because labor would not work without wages of any kind over periods of years, as many investors have been required to do.

Management could not obtain protection of equity investments because they are uninsurable risks.

Agreement on labor as a monopoly was not reached because, under the Clayton Act, labor monopolies are lawful.

Agreement to grant equal rights to employers was not made because, under the Wagner Act, equal rights are denied to employers.

Agreements on jurisdictional labor disputes which cause work stoppages were not reached because such strikes are between different unions, not against employers. The public must be protected against such encroachment of its rights.

Plea for Labor Peace

Management and labor must stop being dogs at one another's throats. When both sides are motivated by full understanding and desire to get agreement, when government stops throwing its weight around in labor matters and passes equalizing legislation, we'll have labor peace in this nation.

Your president, Ira Mosher, and your industrial representatives did a great job in the Labor-Management Conference just ended. They have made clear the differences that lie between the two groups. That is indispensable progress.

We honor our president for his intelligent and firm leadership in these conferences. He, with management's representatives, reached new heights in labor-management negotiations.

The monopoly that labor enjoys today, the special privileges which agriculture and business or any group obtain, the operation of government monopolies, are all against the public interest and now work to create the next depression. Your association opposes all such monopolies.

In 1946, your association will state the case for free enterprise which made America's high standard of living possible. It will explain the process of technological improvements by which production and wages are increased at the same time that costs of goods to the consumer are lowered. It will explain that savings result from postponement of the enjoyment of earnings; that the investment of savings is the only way yet found in America to create jobs. It will show that government jobs are created at the expense of the savings of our people taken in taxes; that when taxes

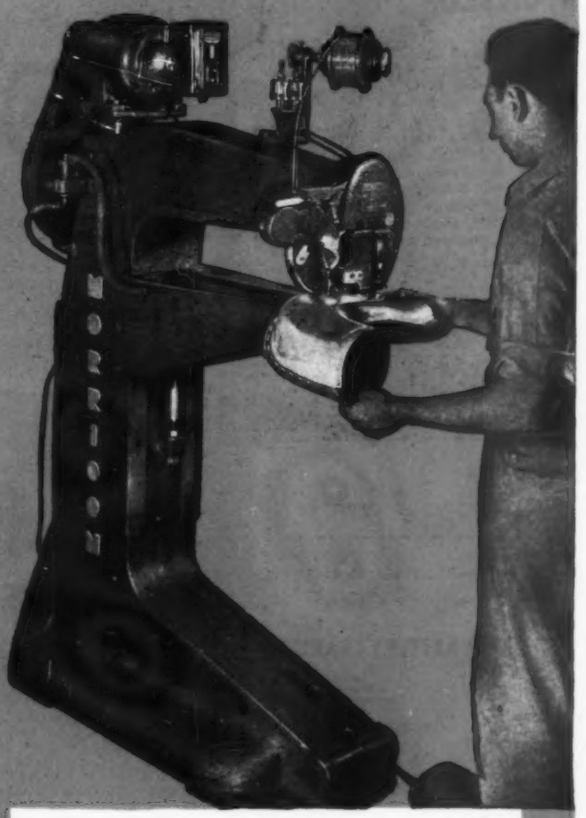
SAVE TIME
with
MORRISON Metal Stitching

VITAL ASSEMBLY HOURS can be saved through Morrison Metal Stitching. This is a fact proved by results obtained in many of the country's aircraft plants already equipped with Morrison Metal Stitchers.

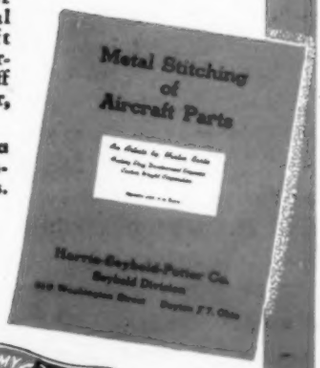
At Curtiss-Wright, for example, the first five jobs converted to the metal stitching process required a total of 67 man-hours as against the 497 man-hours formerly required for riveting. Consolidated Vultee Aircraft Corporation found that Morrison Metal Stitching decreases assembly time by as much as 70% *on many parts.*

NOW these stitchers are available to *all* industries for assembly of steel, aluminum, stainless steel, woods, fabrics, rubber, plastics or other composition materials. The following fabricators of aircraft parts, plus many others, have proved Morrison's time-saving ability:

A.C. Spark Plug Division of General Motors Corp.
Air Technical Service Command
Beech Aircraft Corp.
Bell Aircraft Corp.
Boeing Aircraft Company
Briggs Manufacturing Company
Chance Vought Aircraft Division of General Motors Corp.
Chrysler Corporation
Consolidated Vultee Aircraft Corp.
Curtiss-Wright Corporation
Delco Remy Division of General Motors Corp.
Douglas Aircraft Company, Inc.
Fisher Body Division of General Motors Corp.
Ford Motor Co.
General Fire Proofing Co.
General Motors Corp.
Goodyear Aircraft Corp.
Grumman Aircraft Engineering Corp.
Gulbertson Corp.
Higgins Aircraft, Inc.
Hoover Co., Inc.
Lockheed Aircraft Corp.
Glenn L. Martin Co.
National Gypsum Co., Inc.
North American Aviation, Inc.
Northrup Aircraft, Inc.
Packard Electric Division of General Motors Corp.
Republic Aviation Corp.
Rohr Aircraft Corp.
U. S. Engineers
Willys-Overland Motors, Inc.



Write Dept. F-1 for booklet entitled Metal Stitching of Aircraft Parts, an article by Martin Barbe, Factory Staff Development Engineer, Curtiss-Wright Corp.

We also manufacture a complete line of book, container and steel stitchers.

ARMY E NAVY

Sales and service representatives in all principal cities.

MORRISON
PRODUCTS OF THE SEYBOLD DIVISION
HARRIS-SEYBOLD-POTTER COMPANY
DAYTON F7, OHIO
STITCHERS

IDEAL *Rechargeable*
FLASHLIGHT BATTERY

SAVES $10 on each Flashlight

Recharging is the answer. The *IDEAL* Storage Battery for flashlights, that saves up to $10 on each flashlight. Used by the thousands in heavy-duty flashlight service because each *IDEAL* Battery can outlast 400 or more dry cells, guarantees much brighter, higher top level light. Fits all standard flashlight cases using two 1¼" size D dry cells. GUARANTEED.

Write for Bulletin 345

IDEAL BATTERY CHARGER

Plugs into any light socket. Available in single—6-gang and 12-gang types. Also rechargeable from automobile ignition line.

PROMPT DELIVERY

IDEAL *Sycamore*

Storage Battery Division
IDEAL COMMUTATOR DRESSER CO.
1416 Park Ave., Sycamore, Ill.
Sales offices in all principal cities
In Canada: Irving Smith Ltd., Montreal, Quebec

absorb and prevent savings they impair solvency, reduce wages, and create unemployment. The American people will help when they fully understand.

It will show that profits in American enterprise supply incentives to create services and produce goods, to manufacture at low cost, to live within earned income, to contribute a net profit to the economy. American enterprise supplies incentives to expand operations, to increase markets, to create employment and give jobs to increasing numbers of people. . . .

In 1946, your association will again explain that competition rushes in where profit is available. Your newest products are promptly imitated and their prices cut by old and new competitors. It is this struggle for public approval that protects the public with modernized goods at constantly lower prices.

The Stimulus of Competition

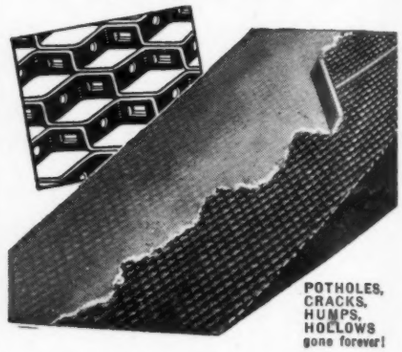
Competition is sometimes denounced as stifling little business. Any little business is more in danger of the rigged markets and prices of government than of competition. Small business provides hard competition for the sprawling giants of industry most of the time. Nothing must interfere with man's chance to risk his money and his brain in starting small enterprise, and growing big—or failing. For American business is 70 percent small fellows.

Because most of your association members are classed as small business, in 1946 your association will continue to sponsor taxes that fit their special conditions. It should be sufficient to offset the added costs of OPA regulations, the costs of added labor relations personnel, the costs of added tax accounting, and other expenses required by Washington bureaus and not included in the average small business budget. The offset is estimated to be federal tax exemption on all earnings up to $50,000.

If jobs are to be created and protected under American enterprise, not only the individual owners of enterprise but the 3,000,000 investors in enterprise must raise their voices. Your association would like to see you and your owners express themselves on the side of harmony and cooperation with the government. Every sacrifice except the welfare of our nation and the interests of your owners will be made to restore confidence of industry in its government, and of government in our industries that pay half of all government costs.

The cooperation that industry gave government throughout the war is avail-

Here's the way to make an Enduring LEVEL FLOOR KLEMP Hexteel with Heavy Duty Surface Armor



Easily, quickly applied. Fill HEXTEEL even with top of mesh with concrete or mastic, and you have a solid level floor for longest severest use. *Lowest Maintenance cost.* Exposed steel bearing surface of HEXTEEL defies heaviest traffic. Use HEXTEEL also to repair old floors.

Send for Klemp Catalog.

Shows Hexteel, Klemp Acme Floorsteel, Open Steel Gratings, Steel Stair Treads, etc. Wire or write.

WM. F. KLEMP COMPANY
"Steel Flooring Specialists"
6616 S. Melvina Ave. Chicago 38, Illinois

—Immediate Delivery!

Model AR

You can depend upon Redington to make *immediate delivery* of these sturdy 100% accurate Counter—"Watchdogs of Production". In models to fit punch presses, pumps, screw machines, packaging machines . . . conveyor lines, can making and box making machinery . . . in fact, *all* types of machinery and production lines. Easy to install. Write for Catalog.

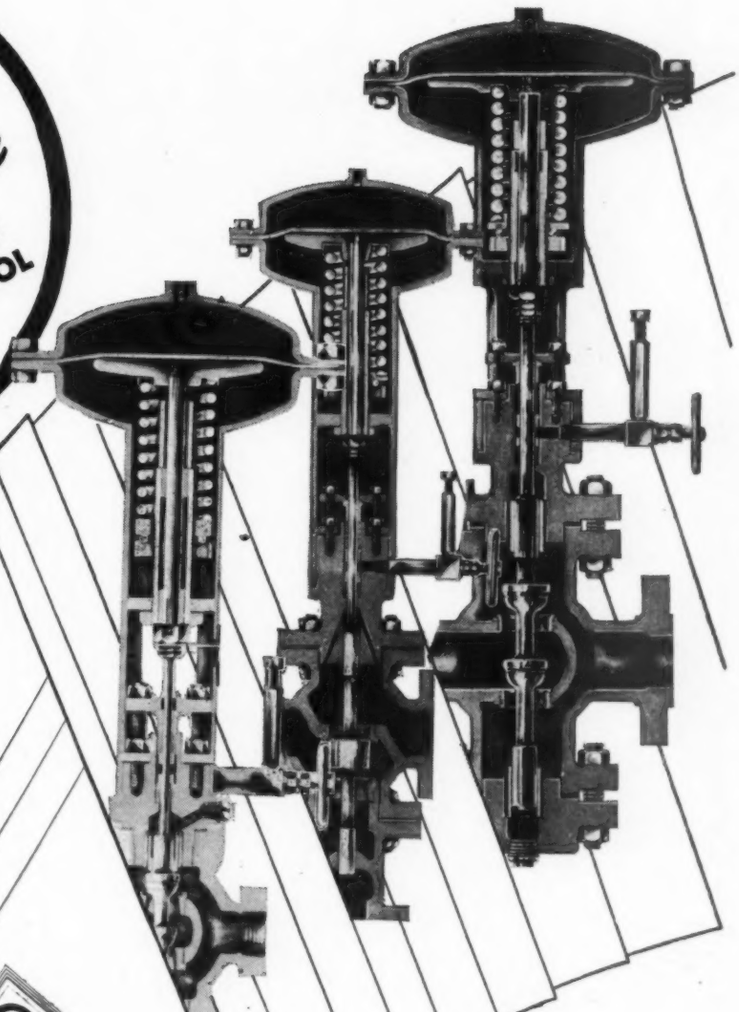
F. B. REDINGTON CO.
105 So. Sangamon Street, Chicago 7, Ill.

AUTOMATIC CONTROL EQUIPMENT

ENGINEERED DESIGN BY HAMMEL-DAHL

NEW *Catalog Now Available*

A COMPLETE LINE OF DIAPHRAGM CONTROL VALVES



Consult Hammel-Dahl engineers regarding your individual problem.

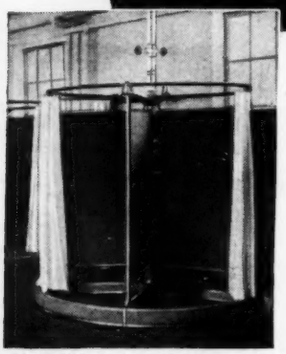
HAMMEL-DAHL CO.

243 RICHMOND STREET PROVIDENCE 3, R. I.

LOS ANGELES SAN FRANCISCO PORTLAND, OREGON

NEW YORK WILMINGTON, DEL.

YOU'LL GET BETTER MEN
If You Provide Better Washrooms



TOP ABOVE: Portion of modern washroom, Pelton Steel Foundry, Milwaukee. BELOW: Typical space-saver Bradley Multi-Stall Shower installation.

COMPANIES SUCH AS THESE ARE INSTALLING BRADLEY WASHFOUNTAINS AND SHOWERS

American Car & Foundry
Milton Bradley
McLagen Foundry Co.
Brown & Sharpe
Chrysler (California)
Singer Mfg. Co.
Remington Arms
Heick Die Casting Co.
Pennsylvania R. R.
Shefford Hosiery Mills
Youngstown Sheet & Tube
Doehler Die Casting Co.
Swift
Pelton Steel Foundry
Simmons
Benrus Watch
Lake City Malleable
Electro-Motive
Acme Foundry
Ponemah Mills
Detroit Steel Castings
Ford
HI Alloy Casting Co.
Arcade Malleable Iron Co.
Hughes Tool
Dodge
Sundstrand Foundry
C. M. & St. Paul R. R.
International Harvester
Pan-American Airways
Curtiss-Wright
Michiana Alloys

MORE PLANTS ARE NOW
Installing Bradley Group Wash Fixtures

Records reveal that workers have a higher rating of efficiency and are more productive on a job where their personal conveniences are properly considered. In many instances, when adequate group washing facilities were installed, employee morale improved along with quality of work produced. Then too, better workers were attracted and turnover decreased.

Sanitary Bradley Washfountains allow your men to clean up thoroughly before leaving work. Workmen can wash to the waist in the clean *running* water from the central sprayhead and there's no delay because each Bradley comfortably accommodates from 8 to 10 persons at the same time. The deep, self-flushing bowl carries away the used water to prevent contamination. In addition to maximum sanitary advantages, Bradleys save space, eliminate numerous piping connections and cut water consumption by 70%. Multi-Stall Showers also offer the same comparable advantages and are available with receptors for installation on any kind of floor, including wood.

You'll find many other interesting and valuable facts about Bradley Washfountains and Multi-Stall Showers in Catalog 4308. Send for a copy today. BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan Street, Milwaukee 1, Wisconsin.

BRADLEY *washfountains* AND *multi-stall showers*

Illustrated Catalog 4308 and Washroom Survey Sheet sent upon request.

able now, as it always has been. In your name, through the proper committees, it will be offered to the President, to his advisors, and to every member of the Congress. We earnestly hope that it will be accepted, and that businessmen of your own high stature can replace the theorists, the freshmen lawyers, and the seekers for special favors, and all the fellow-travelers that now prevent reconversion and will retard prosperity so long as their counsels guide our nation.

In this, the association will ask your personal help. It is notorious that when legislation that would destroy industry impends in Congress, businessmen are reluctant to defend their own interests. This battle can only be won when the top executives of big and little industry go down to Washington to constructively help government.

To Curb Inflation

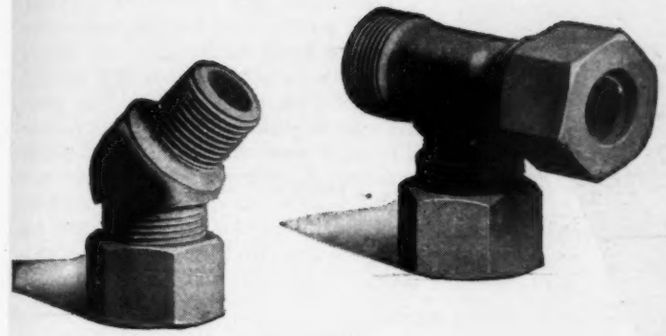
Above all else in 1946 your association will wage battle on inflation. With inflation jobs lose their full value; security becomes impossible. Government is not going to win this fight for us. Too many of those who today determine and administer government policy talk public welfare, criticize every one who disagrees with them, and then design policies that perpetuate special privilege and curtail production. They say the American public favors price controls. What they should say is that the American public is against higher prices. They say goods are scarce, so controls must be continued. They should say that goods are scarce because price controls make it impossible to produce them. They say that only the government stands between the public and inflation. They should say that primarily it is government policy, past and present, that today is responsible for the inflation we have now, and the danger of more inflation that impends.

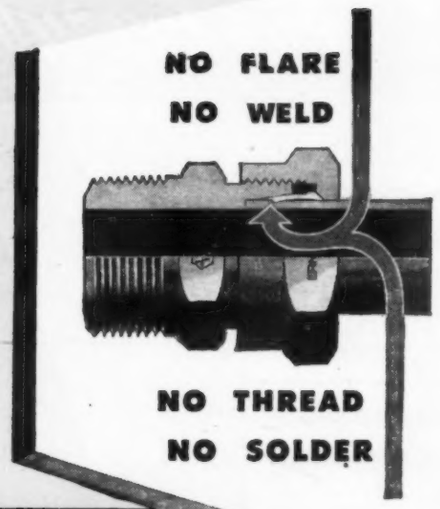
In 1946 your association will fight for the right to produce goods. It will fight policies which now prevent jobs and make it impossible to create that flow of goods without which we never can validate the war savings and bonds now in the hands of the public. Day in and day out it will fight to bring federal expenditures under control so we can once again have a balanced budget.

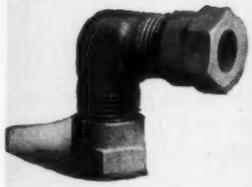
Your association knows that no single act of the government can create so many jobs, allay so much labor strife, induce the investment of so much venture capital, as the prompt balancing of the budget. . . .

Government spending for 1947 should be reduced to $20,000,000,000, including interest on the debt.

In 1946, your association will favor







They're different

they're improved Ermeto fittings!

Weatherhead Ermeto fittings are made in all sizes and types. They can be furnished in O.D. tube or in nominal pipe sizes from ⅛ inch to 2 inch O.D. Ermeto fittings for special installations are also available for a wide variety of uses. These fittings have been field tested and approved in thousands of installations on hydraulic, oil, water, gas and fuel lines. They will withstand excessive vibration for an indefinite period and hold beyond the burst strength of the tube itself. For information or literature, write or phone any Weatherhead branch office.

Write today for this new Ermeto catalog. It's free!

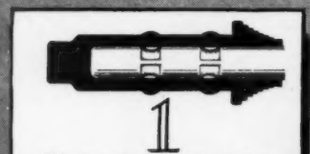
Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND 8, OHIO

Branch Offices: New York, Philadelphia, Detroit, Chicago, St. Louis, Los Angeles

A Good Turn For Everybody!



1

Blade tempered entire length. Recesses forged on end of blade which is driven into steel bolster.

2

Bosses on bolster forced into blade recesses. Blade is now locked into bolster and can never be separated.

3

Bolster and blade are driven into handle securely by hydraulic press. Four wings lock into hardwood handle so blade cannot twist.

No. 55—Small blade, flared tip

No. 45—Small blade, parallel-sided tip

No. 25—Standard blade and tip

Stanley Screw Driver No. 25

This fine tool has gained wide preference in industry—strictly on its record of efficient performance and enduring service. Blade is alloy steel, hardened and tempered its entire length. This and the patented bolster construction provide a Driver of exceptional strength. Blade tip is accurately crossground, flat and true to size, for non-slip fit in screw slots. In production, assembly, maintenance or repair, you couldn't ask for a better screw driver than the famous No. 25—a real representative of the entire Stanley line.

STANLEY TOOLS, NEW BRITAIN, CONNECTICUT

STANLEY

Trade Mark

THE TOOL BOX OF THE WORLD

those revisions in taxes that will assist the creation of jobs. It will ask for higher and more flexible depreciation rates on machine tools that increase labor's productivity and lower costs to the consumer, thereby raising our standard of living. . . .

Your association favors the broadest possible expansion of foreign commerce. No more loyal ambassador can represent America abroad than the quality goods of your manufacture. The positive way to stimulate foreign commerce is to assist production of low-cost goods at home, if we expect to compete successfully with the world. Competitors, local or international, should ask no special favors; by this process the peoples of the world will benefit most.

International Relationships

Our own domestic economy may be vitally affected by international actions taken by the Economic and Social Council of the United Nations Organization and by international economic conferences. Therefore, the National Association of Manufacturers must take a leading part, as the principal United States exponent of free enterprise, in careful examination and recommendation upon the major problems of international economic relations. The United States is the leading power of the world; it is no longer isolationist.

The 19th century belonged to England. The 20th century belongs to America. If the British continue to nationalize their cartels, and if Russia continues to imitate the incentive system of American enterprise, and if America continues to borrow Lenin's Communism that Stalin abandoned in 1936, the 21st century may belong to Russia. Only the restoration of freedom to American enterprise can prevent the future eclipse of America's leadership. The best defense of the welfare of our nation is a defense of the private enterprise system that built it.

* * *

Management's Responsibility for Full Production

F. C. CRAWFORD, President, Thompson Products, Inc.

If a better national welfare is to be created for our people, it must come, not from the acivities of the social and political groups, but from the increased production of our mines, farms, and industries. It is the tremendous responsibility of management to see that our country gets this increased production. Only through increased produc-

Now at your service –

What we learned in war about all four...

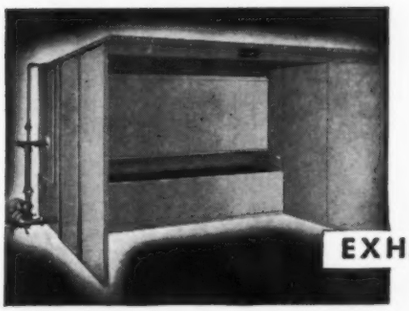
Many an "old dog" learned amazing new tricks at war. Among these was DeVilbiss, pioneer in spray painting equipment, pioneer of important improvements in exhaust systems, air compressors, hose and connections. In meeting the vast variety of unusual demands war placed on these four lines of products, DeVilbiss acquired worlds of new knowledge.

DeVilbiss engineers were continually called on to provide industry with faster, more efficient ways of doing old jobs—and to adapt their products to the performance of many strange, new jobs. Through it all, DeVilbiss spray equipment, exhaust systems, air compressors, hose and connections consistently achieved the "impossible."

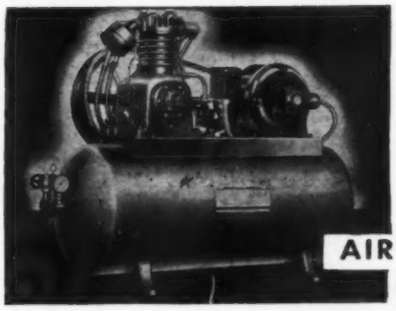
The equivalent of ten years of normal progress in research and engineering crowded into less than four under the spur of war represents a lot of "know-how." And it is this "know-how" that is now being translated into even better DeVilbiss products for the service of industry. Of immediate importance to companies reconverting, this experience is now available to help you achieve greater speed and efficiency in your peacetime operations. A DeVilbiss engineer will answer your call.

THE DEVILBISS COMPANY, TOLEDO 1, OHIO
Canadian Plant: WINDSOR, ONTARIO

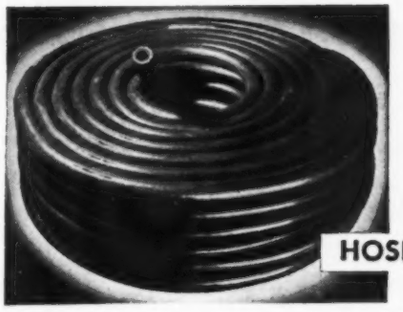
SPRAY EQUIPMENT



EXHAUST SYSTEMS



AIR COMPRESSORS



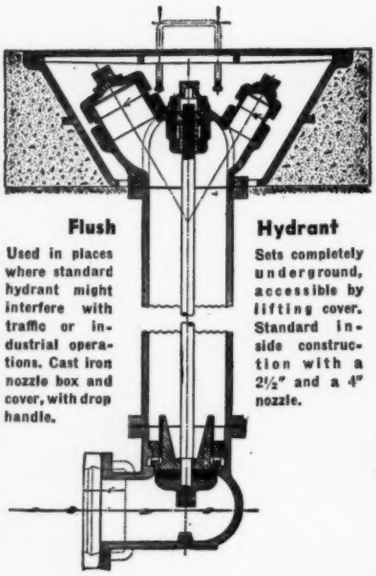
HOSE & CONNECTIONS

DE VILBISS

means **Quality** *in all four..*

SPRAY EQUIPMENT
EXHAUST SYSTEMS
AIR COMPRESSORS
HOSE & CONNECTIONS

HYDRANTS, VALVES



Flush
Used in places where standard hydrant might interfere with traffic or industrial operations. Cast iron nozzle box and cover, with drop handle.

Hydrant
Sets completely underground, accessible by lifting cover. Standard inside construction with a 2½" and a 4" nozzle.

Write for Catalog No. 34

CHECK VALVE **GATE VALVE**

M & H valves are used in industrial plants for water, gas, steam, oil, chemicals and are furnished in all commercial sizes from 2" to 30", inclusive. They are cast iron body, bronze mounted, furnished double disc parallel seat or solid wedge. They are heavily proportioned and have a high factor of safety.

OTHER M & H PRODUCTS

Fire Hydrants
Gate Valves
Tapping Valves
Special Castings
Tapping Sleeves
B & S Fittings
Check Valves
Floor Stands
Extension Stems
Mud Valves
Flap Valves
Sludge Shoes
Flanged Fittings

M & H VALVE
AND FITTINGS COMPANY
ANNISTON, ALABAMA

tion can come a higher standard of living and a better future for all our people . . .

So much has been said about jobs and wages and so little about production that many of our people have lost sight of their goal.

The idea has spread that labor-saving machinery destroys the standard of living, that efficient production puts people out of work, and that a surplus is an evil thing causing unemployment, depression, and disaster. How twisted the thinking that would deny the jobholder the aids of production that become the measure of his wages, and the surplus that is his security. How curious that a man sees the need of laying away a nestegg, a surplus, for a rainy day, yet believes a national nestegg to be something terrible.

Redefinition of Values

Perhaps the time has come to restate to our people some fundamental principles, to define the American way that has led the world in productivity.

Free enterprise is not a system. It is simply human nature left free to express itself. It is a composite of consumers seeking better products at lower prices; investors striving for a reasonable return; workers ever seeking higher wages and better working conditions; management constantly striving to increase the rate of production in order to produce more useful things per hour of human labor and thus creating wealth to satisfy the consumer, investor, and worker. This is free enterprise!

Today business management stands almost alone as the guardian of America's productivity. Management's duty in this post-war period is zealously to promote and practice every policy that consistently and with a fair regard for human values will increase productivity. It must fiercely and courageously attack every plan, scheme, or proposal that will reduce productivity. As a guide for our course, let us list some fundamental facts of production.

1. We must produce more in order to have more.

2. Production is the source of purchasing power.

3. High wages are the result of high production—not the cause.

4. The standard of living depends on the amount of food, clothing, and shelter produced—not on the size of the public debt or the amount of printed money.

5. Industry can exist only by serving the public well with high quality and fair prices.

6. No person can long be paid a wage

SOLAR
Electrical Products

Quotation on request
SOLAR ELECTRIC CORPORATION
WARREN, PENNSYLVANIA

CLEAN... PROTECT... PRESERVE... YOUR FLOORS

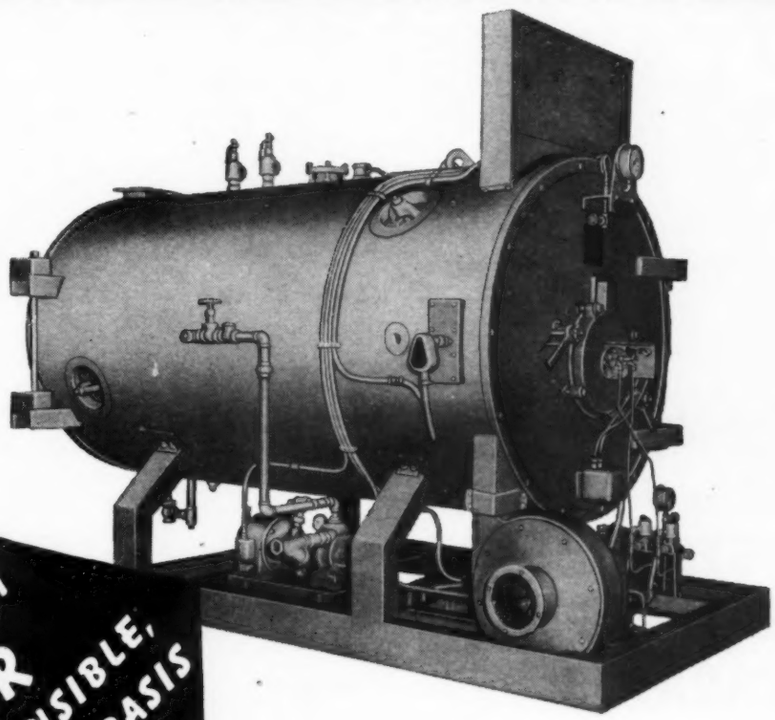
VEN-OL FLOOR SEAL
seals the pores, hardens the surface, and eliminates dusting!

VEN-OL FLOOR WAX
eliminates dusting, prevents chattering and chipping!

VEN-OL FLOOR KLEENER
acts four ways: (1) seals (2) restores (3) Cleans (4) preserves!

Industry is to-day using Ven-ol Products. For details, write to-day, without delay,

The **VENITE COMPANY**
250 S. BROAD STREET
PHILADELPHIA 2, PA.



IF YOU WANT POWER ON A SENSIBLE, LOW-COST BASIS

AMESTEAM *Generator*

The AMESTEAM Generator is a wonderful power plant. In one self-contained unit, it provides all the features that any small or medium-sized plant may require!

It takes a minimum of manpower at all times, because it's easy to install, easy to operate, easy to repair. And it delivers a maximum of power because of the excellence of its design and manufacture. It gives steam *rapidly* . . . and with complete cleanliness . . . and requires no expensive foundation or stack.

Available in units from 10 to 300 horsepower, it provides power, on a sensible, low-cost basis . . . and it is backed by Ames' 100 years of experience. Write or phone for full information.

AMES IRON WORKS

BOX H-1 OSWEGO, NEW YORK

now OXYGEN
from a chemical canister

TO PROTECT LIFE
IN UNBREATHABLE AIR!

THE REVOLUTIONARY
M·S·A
Chemox
SELF-GENERATING

OXYGEN
BREATHING
APPARATUS

Battle-proved in war, this unique achievement of M.S.A. Research brings new ease and simplicity to the safe protection of workers in respiratory emergencies. When it is necessary to enter gaseous, smoke-filled, and oxygen-deficient atmospheres for rescue or emergency work, M.S.A. CHEMOX supplies oxygen from a replaceable canister, permitting safe repairs, fire-fighting, or escape. *Write for Bulletin BM-8!*

- Generates its own oxygen
- Gives one hour's protection in unbreathable air
- Weighs only 13½ pounds complete
- No cylinders, high-pressure valves or fittings
- Fog-free lenses
- Simple to use

ONE REPLACEABLE CANISTER DOES THE WHOLE JOB!

MINE SAFETY APPLIANCES COMPANY
BRADDOCK, THOMAS & MEADE STS. · PITTSBURGH 8, PA.
District Representatives in Principal Cities
In Canada: MINE SAFETY APPLIANCES COMPANY OF CANADA, Ltd.
TORONTO, MONTREAL, VANCOUVER, CALGARY, NEW GLASGOW, N. S.

that exceeds the value of his production.

7. Increased wages paid to any group, without a corresponding increase in production, merely takes from others and destroys the balance that is essential to continued productivity. They lead to higher prices, eventual inflation, reduced demand, reduced production, and finally disaster.

8. Better tools for production increase production. Industry cannot provide better tools unless industry is profitable and attractive to investors of capital.

9. Seventy-five percent of all risk capital that provides jobs has been accumulated by plowing in profits. Without profits, no new jobs can be created, no higher wage is possible.

10. Cooperation between management and labor in efficient use of tools is necessary to high production.

11. This is a free country. No man can be made to do anything against his will. Therefore, cooperation must be voluntary and depends upon mutual trust and confidence.

12. Production takes place at a local level, not in Washington, not in a national labor leader's office, not at the headquarters of a national manufacturers' association. Only management and workers locally at the place of production can cooperate to achieve full productivity.

13. There can be full productivity only when men are free to start business, risking their money in hope of gain; when workers are free to work for whom they wish, and when and where they wish; when management can contract for a fair day's work and workers can contract for fair wages for that work.

We must remember these basic facts. They represent natural laws. Management must challenge and resist any proposal that fails to recognize them or that interferes with their free operation.

Management must seek new and better tools for production. It must resist any and every attempt by anyone to drive a wedge of misunderstanding between management and worker. It must defend and use its right of free speech. It must resist those overzealous members of adminstrative government who have unjustly tried to deny that right. It must demand correction of existing laws, in our tax structure and elsewhere, which interfere with the natural laws of production. It must demand that our labor laws be fair—that

For a Bruiser he was always a "Weary Willie"

He was no weak sister. But that slow, nerve-straining, muscle-cramping drudgery of hand-driving slotted screws kept him a high-cost, low-output worker. In fact, Bill and his whole department were *low* all the time . . . in production, spirits, and health . . .

. . . 'til AMERICAN PHILLIPS SCREWS stopped him from "beating his brains out"

Bill's boss got to analyzing his costs one day . . . found that his screw-driven assembly cost was the *only cost he could cut,* and that there was *only one way to do it.* So he threw out his hand-drivers and slotted screws . . . put in power-drivers and American Phillips Screws.

Now his assembly costs are down 50%. His output is at an all-time high, and so is product-quality. What's more, Bill's department has taken new interest in the job, and no longer bogs down from exhaustion toward the end of the shift. All because American Phillips Screws are:

1. *"Fumble-Proof"* . . . screw and 4-winged bit fit firmly into one straight unit that can't drive any way *but* straight. No wobbly starts, no dropped screws.
2. *"Slip-and-Slash-Proof"* . . . bit and screw can't twist apart till screw is driven up tight and flush. No spoiled work or gashed hands.

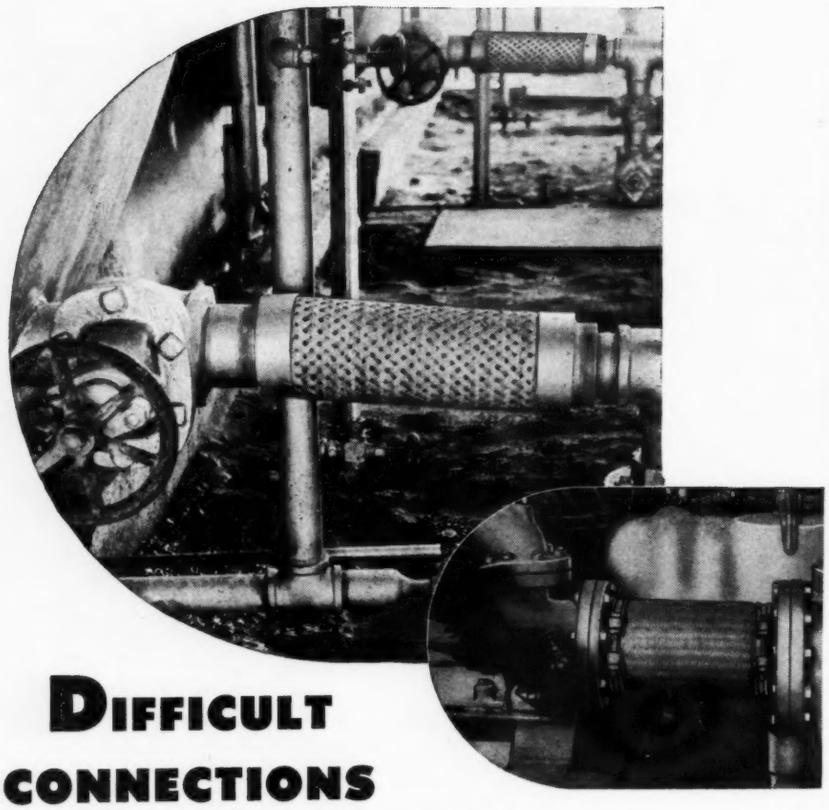
Now add a third advantage . . . American's 4-phase quality control that means higher "perfection-percentage" in every shipment of American Phillips Screws . . . and you have your top opportunity for cost-control looking you right in the face! Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois Street *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

Guaranteed Free from Burrs and Split Heads



DIFFICULT CONNECTIONS ARE *EASY* WITH REX-WELD!

Here's Rex-Weld, RW-91—the easy, economical solution to your difficult connection problems! For this Flexible Metal Hose is ideal for

- **correcting misalignment**
- **connecting "hard-to-reach" inlets and outlets**
- **hose lines that must be frequently connected and disconnected**
- **temporary hookups**

RW-91—made in steel and bronze—withstands temperatures to 1200° F and burst pressures to 2700 p.s.i.—depending on I.D. In addition, it's leakproof and is available with helical or annular corrugations, beamed braid or braided braid. Helical sizes range from 3/16" to 4" I.D.—annular sizes from 5/32" to 2" I.D. REX-WELD, RW-91 is ready to go to work for you now! Ask for Bulletin E-144.

Flexible Metal Hose for Every Industrial Use

ARMY E NAVY

CHICAGO METAL HOSE CORPORATION
MAYWOOD, ILLINOIS

Plants: Maywood and Elgin, Illinois

they treat management and worker alike in requiring performance of contract.

All these things are part of management's responsibilty for full production.

But there is something more that management is to do if it is to be successful.

New Division Needed

The need for a "Human Relations Division," has arrived. It has become the most important tool for productivity. Too few managers have realized this. Too few have prepared for it. Of those who have recognized the need, too many have thought the job accomplished by a careless designation of some pensioner as "personnel manager." This is a job for top management and can't be delegated. Consider the problem of a manager whose production calls for 200,000 hours of human labor per week.

Had the Almighty known of mass production when he created the world, he would undoubtedly have allotted 200,000 hours to this manager. How wonderfully those hours might have been used in the production machine. But hours of labor were dealt out eight working hours to each individual, whether good or bad, diligent or lazy, cooperator or troublemaker. The manager must go out on the highways and byways and call for 5000 volunteers who will put their hours of labor into the hopper. When they are finally lined up, the manager will find them to be all different in outlook, temperament, and degree of skill—but all free men with the free will to cooperate or not as they please. Five thousand persons—chances for misunderstanding—each of whom can upset or retard the production machine. What a spot the manager is in! Is his case hopeless? No.

Suppose that you are the manager. You sit in your office wondering what your workers are thinking. Do you realize that those workers are just a few feet away and that they are wondering what you are thinking? Do you know that the answer to your human relations problem lies within the four walls of your plant? Go into the factory.

Call your workers together. Ask them about their problems. Tell them about your problems. Explain the relationship between wages and job security and productivity. Review the natural laws of production. You will be amazed at the response. You will find that they are good citizens, patriotic and honest. You will find them to be individuals, each intelligently seeking what is best for himself. You will discover pride—in their work, in their company—and if you give them a chance, in their boss.

Time-honored abrasive products are now further distinguished by *a renowned name*

SIMONDS ABRASIVE CO.

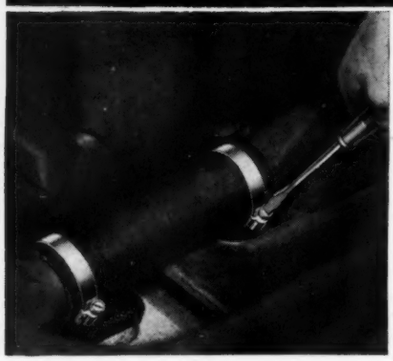
For more than half a century the name Abrasive Company has been synonymous with high quality grinding wheels and abrasive products. With the years has come a tremendous increase in the use of such products and the unqualified trademark designation "Abrasive" is now inadequate as a general term to distinguish this old company. Therefore, in order to establish a more distinctive identity for the organization, a more individual crest for its quality and service, the name Simonds, renowned for over a century for excellence in cutting tools, will designate product and company.

Operating under the same management and policies, SIMONDS ABRASIVE COMPANY will continue to turn out the same products of top performance which so distinguished the Abrasive Company during the past half century. SIMONDS ABRASIVE COMPANY goes forward, pledged to continue to justify the confidence of its old customers and to merit and inspire the patronage and good will of new ones.

SIMONDS ABRASIVE CO., TACONY AND FRALEY STS., PHILADELPHIA 37, PA.

"Aero-Seal"

WORM DRIVE
HOSE CLAMPS



Try this
FOR YOURSELF!

Get a FREE sample "Aero-Seal" Hose Clamp and see for yourself how much better it is than ordinary clamps. See how it pulls up tight and leakproof with only moderate effort. See how the WORM DRIVE works—how compact it is—how much greater take-up it affords. See the quality features: no-slip cup, hardened screw, spring steel band, rustproofing. See how quick and easy "Aero-Seal" is to put on, take off, tighten up. Let "Aero-Seal" prove its own worth.
FREE! *Use this coupon.*

AIRCRAFT STANDARD PARTS CO.
1779 19th AVE., ROCKFORD, ILL.
Please send me one sample "AERO-SEAL"
Hose Clamp. Size preferred.....
NAME_____
COMPANY_____
ADDRESS_____
CITY_____STATE_____

and sympathy for the underdog. You will find them to be long on intelligence—but short on knowledge of the laws of production, because no one has explained those laws. You will discover a deep interest in the problems of your business—sales problems, production and manufacturing problems. They will welcome information concerning possible expansion and they will be sympathetic if you explain possible reductions.

Have regular meetings. Tackle any subject that appeals to them. Give honest answers to every question.

The meetings will improve as you build in your workers a confidence in yourself. The results will amaze you. You will have found the answer to your human relations problem.

I want to dispel a notion that is widespread among management, the idea that the boss can't talk to his men. Our Constitution guarantees the right of free speech. The right extends to any subject including national labor unions—so long as we don't threaten or slander.

Use your right of free speech to attain full productivity. Our courts will back you up.

We are in the midst of serious and complex problems; widespread strikes, bickering, misunderstandings, intolerance, and over-all the danger of inflation. Management's contribution to a solution of these problems can be a magnificent one.

•

Dealing With Safety and Incentive Problems

(Principal portions of two of the major speeches delivered before the recent annual meeting of the American Society of Mechanical Engineers follow.)

Management Control of Industrial Accidents

A. E. EDWARDS, Vice-President for Manufacture, Ford Instrument Company, Inc., Long Island City, N. Y.

This paper is constructed around actual experience at the Ford Instrument Company and the greater portion of the recommendations made herein have been found to contribute to the solution of the problem of industrial accidents.

Safety must be recognized as being an important phase of factory management. It is believed essential that the safety department be established as a staff department, within the direct operating organization, with recommendations to and instructions from

WHERE IS THAT ODOR COMING FROM?

No matter the source—give Oakite TRI-SAN a chance to get at it! TRI-SAN does not substitute odor-for-odor. It kills at the source, leaves no evidence. TRY IT TODAY! Costs only 1¢ for normal solution of 1 ounce TRI-SAN to a gallon of water (hot or cold) ... and for that same penny, in addition to deodorizing action, TRI-SAN gives light soil removal PLUS disinfection . . . all in the same simple application!

FREE BOOKLET TELLS HOW TO USE OAKITE TRI-SAN

for effective, speedy, low-cost sanitizing of . . .

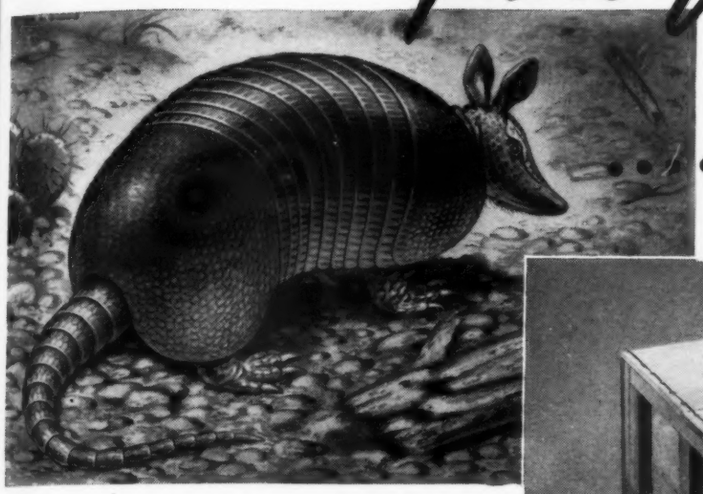
Floors	Restrooms
Lockers	First Aid Rooms
Shower Stalls	Garbage Cans
Wash Basins	Restaurants
Toilets	Cafeterias
Urinals	Drains

Write today for how-to-apply details. Ask for FREE 20-page TRI-SAN handbook. No obligation.

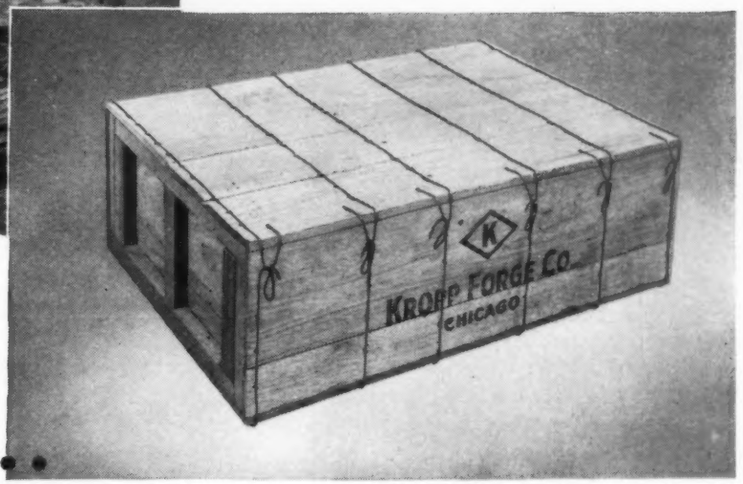
OAKITE PRODUCTS, INC.
14A Thames Street, New York 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE *Specialized* **CLEANING**
MATERIALS • METHODS • SERVICE

THE CONTAINER IS "Part of the product"



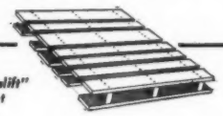
...NATURALLY



GENERALLY.....

NEW
"GENERALIFT" PALLETS

Millions of pallets were used by the armed forces. They saved from 50% to 90% in materials handling. We are now in full production of pallets for all industry. Our engineers will design a pallet best suited to your specific needs. Write today for free Pallet Book.



"Generalift" Pallet

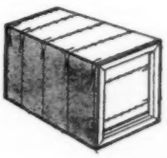
Look to the Armadillo

—come what may, he goes his way. When danger threatens, he quickly rolls into a tight ball—protected on all sides. And so . . . GENERAL Engineered Shipping Containers are also designed as "Part of the Product." They're engineered to follow the profile of the product—there's no wasted space, no needless weight. GENERAL Boxes are extra strong and compact.

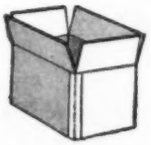
It doesn't matter how fragile or rugged the product may be—how large or small—our engineers will design a container that's best suited for the shipment of that product. Often special inner-packing and blocking provide added interior protection. Frequently the product and container can move together—as a unit—down your production line.

Let us tell you more about our "Part of the Product" Plan. It's an important story. It's a story that will conserve packing materials and man-hours, that will save space and speed production.

General Nailed Box

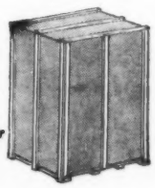


General All-Bound Box

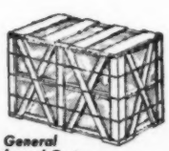


General Corrugated Box

Write today for your free copy of booklet on GENERAL's *"Part of the Product" Plan.*



General Cleated Corrugated Container

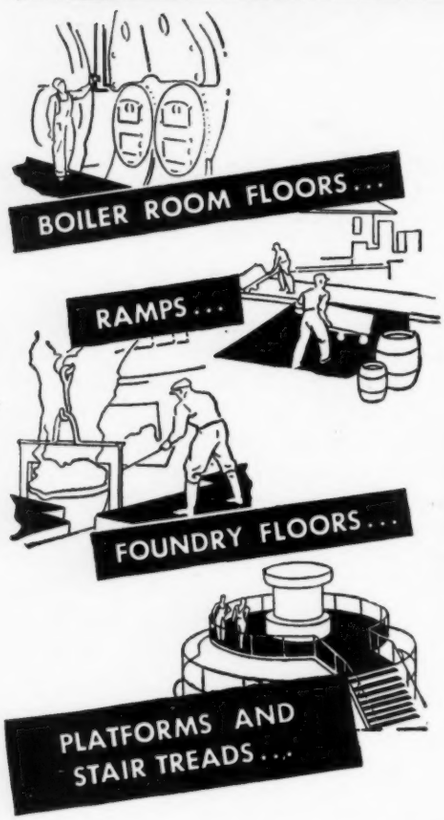


General Wirebound Crate

ENGINEERED SHIPPING CONTAINERS

GENERAL BOX COMPANY

GENERAL OFFICES: **504 North Dearborn St., Chicago 10, Ill.**
DISTRICT OFFICES AND PLANTS: **Brooklyn, Cincinnati, Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, New Orleans, Sheboygan, Winchendon.**
Continental Box Company, Inc.: Houston, Dallas.



YOUR crews will walk and work safely on the patented flat-top risers of U·S·S Multigrip Floor Plate. The safety pattern also is scientifically designed to promote foot comfort, to lessen fatigue.

The safety tread stays safe throughout long, hard service, yet can be quickly and easily cleaned, drains promptly, allows vehicles to roll freely.

When you protect wood or concrete floors from the wear and tear of plant traffic, they last longer, with less up-keep. U·S·S Multigrip Floor Plate also increases structural strength. It can be cut to any desired shape, quickly and easily installed at low cost.

Reduce man-hours lost through accidents—specify Multigrip Floor Plate for platforms, ramps, runways, floors, stairs and walkways.

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air.* American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

U·S·S MULTIGRIP FLOOR PLATE

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Export Company, New York

UNITED STATES STEEL

top operating management. It must be completely objective in its approach to the problem so that operating management will not be influenced by employer prejudice and possible erroneous assumption of fact.

The Safety Director

The safety director's qualifications should include the following specific attributes:

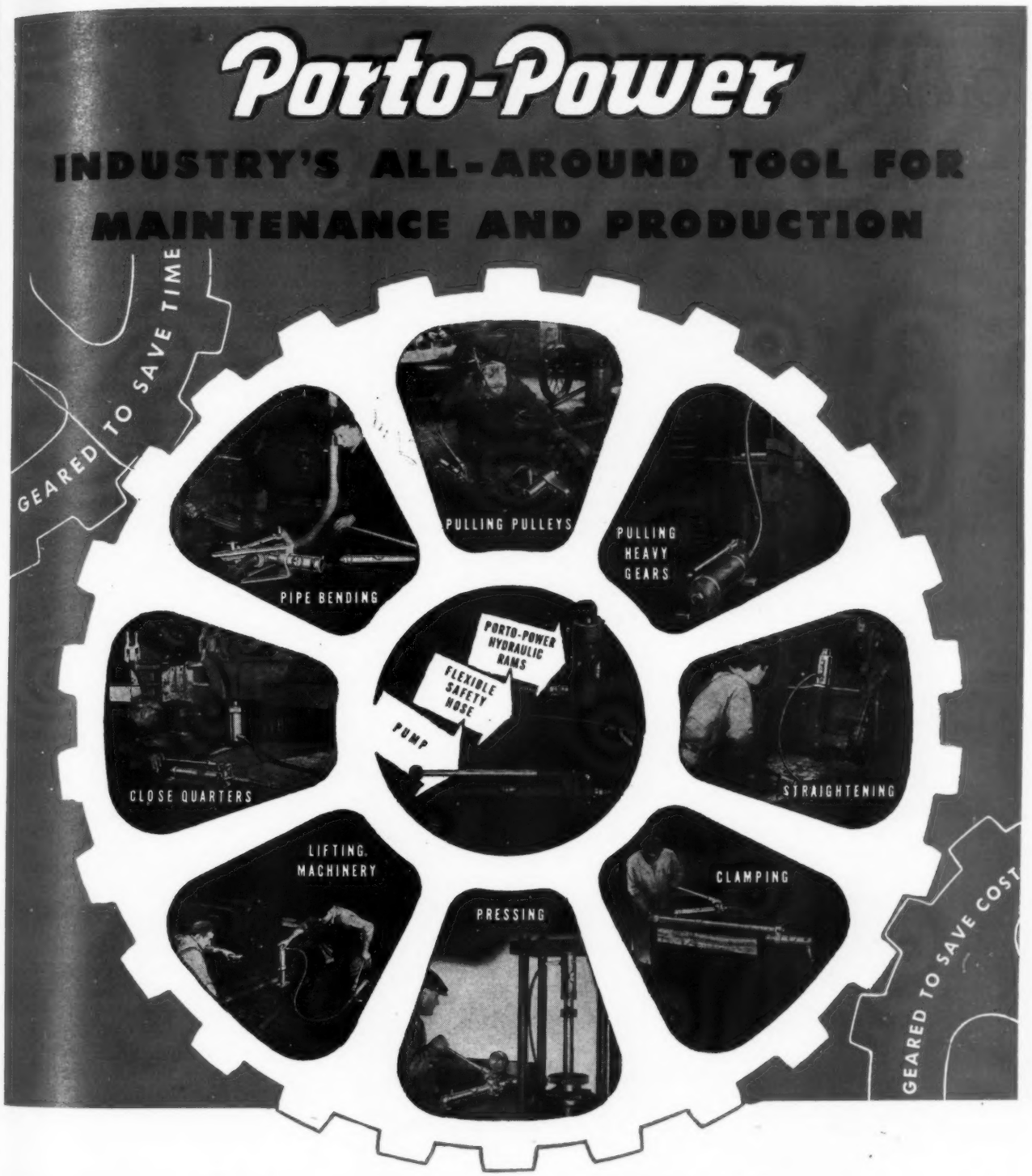
Primarily, he must be sold on the value of safety work for its own results and the responsibility should not be delegated to an individual who may include safety as one of many other functions. It is believed preferable that the safety director have a background in engineering rather than of the liberal sciences, because of the approach to a problem which engineering training insures. In addition, because of his contacts with the personnel of the plant, he must have the faculty of successfully selling his ideas to the individuals with whom he has contact. In order to accomplish the aims of a safety program, he will have to use much creative thought, similar to that required by advertising and sales promotion companies, and he must be prepared to carry the thought from its inception to the actual completed result at the point of operation. He must be vitally interested in the welfare of his fellow-employees and at times may have to assume the position of being prejudiced in their favor, in cases in which there is no clear cut line of demarcation. He must be capable of analyzing statistics and trends of the conditions which are revealed to him though his reporting system, in order to advise management of actions which might well be taken in view of changing conditions. Technically, he must be prepared with a thorough knowledge of compensation laws, procedures and interpretations of insurance company operations, in order to assure the company of adequate protection in case of need. A requirement which is frequently useful, but not always necessary, is that of job analysis. He should be familiar with the physical requirements of the various types of operations within the plant, in order to insure or advise against improper placement of workers.

We have established various levels of organization from personnel in the manufacturing division with certain broad duties and functions. Committees are made up of members who have as additional duty to their supervisory function, the responsibility for passing and checking on the safety conditions of the entire plant.

The general safety committee meets

Porto-Power

INDUSTRY'S ALL-AROUND TOOL FOR MAINTENANCE AND PRODUCTION



BUILT to be versatile, Blackhawk Porto-Power is the miracle hydraulic tool of 1001 uses. Compact, easily transported and operated by one man, this all directional jack brings tons of hydraulic power right to the job. Dependable for production operations, versatile for maintenance work, it readily builds up into combinations to push, pull, bend, spread, press, and clamp. Produced in 7, 10, 20, and 50-ton models. For more information on Porto-Power (and also Blackhawk Hydraulic Jacks and Wrenches), see your industrial supply distributor or write us.

A Product of **BLACKHAWK MFG. CO.,** Dept. P2716 **Milwaukee 1, Wis.**

BLACKHAWK

Quality... AND LONG WEAR

Replaced after over sixteen years of service this 18" heavy, double Tannate leather belt, 69 feet long, was shortened only once in all those years. This, in spite of the fact that the original load was increased by over 40 percent.

TANNATE leather belting is made from leather of special tannage which gives it exceptional grip, pliability, elasticity, strength and durability.

It has a remarkable pulling surface. Tannate can transmit more power with less tension than most belts, consequently there is less strain on the bearings.

A TANNATE belt, operating under the same conditions as the average oak belt, has about 20% greater capacity at the recommended rated load of the oak belt. If this load is increased a third the Tannate belt will have more than 70% greater capacity than the average oak belt.

A dry heat of 212° F. and damp heat of 170° F. have no appreciable bad effect on Tannate. It better withstands mineral oils, acid fumes and dilute acids than oak tanned belting.

Tannate belts deliver more power because of their exceptional grip and capacity.

Consult Rhoads Engineering Service. Let us offer our solution to your belting problems.

Rhoads *Tannate* **WATERSHED LEATHER BELTING**

J. E. RHOADS & SONS 35 N. SIXTH ST., PHILA. 6, PA.

Established 1702 NEW YORK · CHICAGO · ATLANTA

quarterly or as often as necessary to act on policy development. Its membership includes the vice president in charge of manufacturing (chairman), general plant superintendent, four plant superintendents, manager of buildings and grounds, and the safety engineer, who serves as secretary.

The committee passes on reports and minutes of the foreman's safety committees. Other functions include:

1. Development of standards for safety equipment.

2. Safety standards for the design and purchase of new equipment.

3. Develop standard operating safety practices including safety rules and systems of reward or penalty. Any question of safety policy including the decision of what to do with any specific problem that arises.

4. Accident cause classifications for statistical purposes.

5. To review all material that may be referred for action by unit safety committees.

6. The general safety committee is the approving body on all matters of policy, and designates authority to the unit safety committee.

The foreman's safety committees meet monthly on both shifts in each plant. The purpose of these meetings is primarily educational, although authorization on practically all recommendations can be given by members present. Members are as follows: Plant superintendent (chairman), union representative-(workman's inspection committee chairman), plant engineer, labor relations representative, four factory foremen, one non-factory department head, safety engineer (secretary).

In addition to the educational benefits derived from the discussions in these meetings, the committee carries out the following functions:

1. Acts as a clearing house for all safety ideas and activities following through on them until finally disposed.

2. Reviews investigation of all accidents and is responsible for preventative action.

3. Supervises safety contests or competitions.

4. Assists in deciding questions on applied safety standards.

5. Furnishes the general safety committee with the minutes of its

GOOD THINGS AHEAD

It is reported that . . . . . .

A technical magazine states that the war-developed arc-oxygen electrode will cut quarter-inch steel plate at the rate of a foot per second while under 40 feet of water. *Metal and Thermit Corp.*

get ready with CONE for tomorrow

It is estimated that within a few years 80% of the coal mined underground will be removed from the mines on conveyor belts instead of in cars. *Scientific American.*

get ready with CONE for tomorrow

The PV-3 helicopter has a long fuselage with a rotor on each end and carries twelve persons. It is being tested by the Coast Guard and Navy. *Popular Science.*

get ready with CONE for tomorrow

A new cement, for use in concrete flooring, is said to drive away insects, kill bacteria, and prevent the formation of molds. It also dissipates static electricity. *H. H. Robertson Co., Pittsburgh.*

get ready with CONE for tomorrow

An appliance manufacturer announces an electric washing machine that can also, by the use of attachments, wash dishes, peel potatoes, churn butter, and freeze ice cream. *Hurley Machine Division Elec. Household Utilities.*

get ready with CONE for tomorrow

A new gasoline-powered lawn mower resembles a floor scrubbing machine. It is mounted on four wheels and uses a rotary knife revolving at 3,000 r.p.m. *Whirlwind Lawn Mower Corp., Milwaukee.*

get ready with CONE for tomorrow

The manufacturer of the jet engine used in the P-80 Shooting Star prophesies that all transcontinental planes will be jet-propelled within five years. *General Electric.*

One of the war devices that may survive to help the motorist is the tire gauge that registers on the dash, developed for the Army's amphibious "duck." *GMC Truck and Coach Div.*

get ready with CONE for tomorrow

A magnetic survey of the state of Florida shows large areas in the southern part that are favorable for the occurrence of petroleum. *U. S. Dept. of Mines.*

get ready with CONE for tomorrow

Meals are being served in the Naval Air Transport Service that are pre-cooked, packed in a covered paper plate and frozen. On the plane they are thawed and heated in a special oven. *Maxon Sky Plate, W. L. Maxon Corp., 460 W. 34th St., New York.*

Air conditioned trolley cars are being introduced in a Southern city. This is said to be the first use of such equipment in city vehicle transportation. *Atlanta, Ga.-Pullman-Standard.*

get ready with CONE for tomorrow

A new household electric light switch can be set for delayed action up to three minutes. *T. J. Mudon Co., 1240 Merchandise Mart, Chicago.*

get ready with CONE for tomorrow

Rubber V-belts molded around a steel cable have been developed to replace chain drive on Army motorcycles. *Goodyear, Akron 16, Ohio, Whizzer Motor Co., Los Angeles.*

get ready with CONE for tomorrow

Even the common wire nail has been improved. The new type has a notch in place of the point and is claimed to be non-splitting. *E. S. Gair, Snyder, New York, inventor.*

meetings and other detail pertinent reports, including recommendations for further action.

The workman's safety inspection committees are made up of three shop stewards in each of our four plants on the first shift. These men are appointed by the safety engineer from a list provided by the union president. Each month one member is dropped and a new member is appointed, leaving always two experienced men with the new man to make the inspection. When the member is dropped he has done his turn of three monthly inspections and now is given the opportunity to sit in with management to make up the membership of the monthly foreman's safety committee. Here he has the opportunity to discuss with management any of the unsafe conditions and practices he observed on his tour of inspection. The knowledge that recommendations are being carried out, and perhaps some that he recommended are impracticable, is of educational benefit to him. This knowledge prevents many grievances on unsafe conditions, which to the shop steward would be serious especially if he felt that management was doing nothing about the recommendations. These men are given distinguishing badges which they take pride in wearing, and the act of doing an inspection job gives them pride, in that they feel they are aiding in safeguarding their own workers. Energies, otherwise wasted, are put to good use.

The Safety Inspector

Each foreman or department head, on both shifts, has one safety inspector, appointed by him and responsible to him for all unsafe conditions or unsafe practices observed during his regular duties in his department (a general helper, rather than a machine operator, is preferred). In this way many unsafe conditions of the plant and equipment, and unsafe practices of the employees, can be corrected immediately without discussion in regular safety meetings.

Safety engineers inspect each plant on both shifts not less than once a week. Recommendations on unsafe working conditions and employee practices are compiled with those of the workman's inspection committees, War Department, Labor Department, etc., and submitted to the monthly foreman's safety committee meetings for discussion and possible corrective action. . . .

All rearrangements of the plant are reviewed by the safety department prior to the performance of any work, for criticism and recommendations which may be revealed by their study. Conditions which may create hazards are thus prevented prior to their installation and excessive cost is prevented

DROP FORGINGS

ON THE TABLE

Use RITCO bright finish drop forgings wherever strong, uniform parts are required . . . for household implements, machine parts, tools, etc. Produced by experienced operators with modern machinery, RITCO forgings are smooth and free of flash — uniformly strong and accurately made to your specifications, in weights from ¼ lb. to 15 lbs. Complete finishing equipment. Estimates gladly submitted.

Remember **RITCO** *for*

Drop Forgings
Hand Screw Machine Products
Special Bolts, Nuts and Studs
Centerless Grinding

See our exhibit at Booth A-738, National Metal Congress and Exposition

RHODE ISLAND TOOL COMPANY

148 West River St., Providence 1, R. I.

Serving American Industry Since 1834

Day Long Protection on "Semi-Hazardous" Jobs

• **Workers keep the Willson Protecto-Shield* *on*. Because it combines safety with real comfort and smart appearance. Ideal for light duty jobs. Examples: spot welding, light grinding, wood working.**

• **Lightweight visor swings up easily when not in use. Held firmly in place by exclusive "Slot-Lock." Both visor and sweatband easily replaceable. Shield is roomy enough to wear over glasses.**

• **Oversize visor available to guard sides of face and ears from splash and flying particles. Three visor lengths: 4, 6 or 8 inch. Two thicknesses: .030 or .060 inch. Two colors: clear or Willson Tru-Hue green, which prevents color distortion.**

For help on eye protection problems get in touch with your Willson distributor or write for information.

*T.M. REG. U. S. PAT. OFF.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

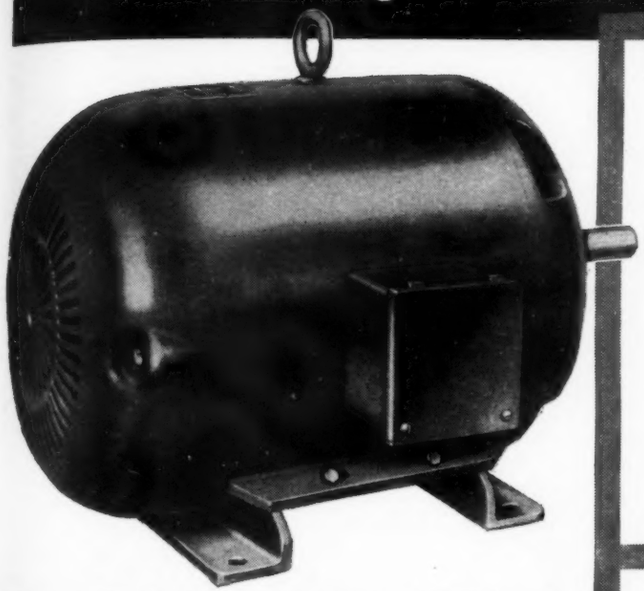
DOUBLE WILLSON

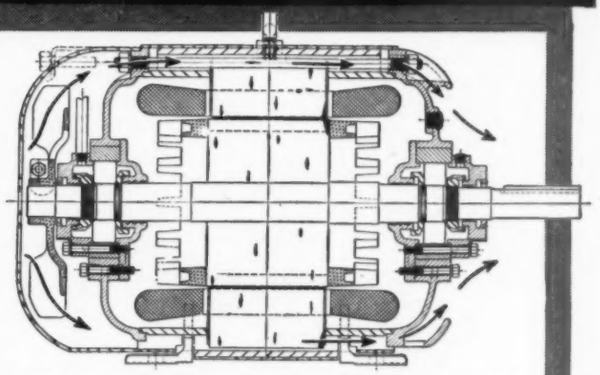
PRODUCTS INCORPORATED

Established 1870

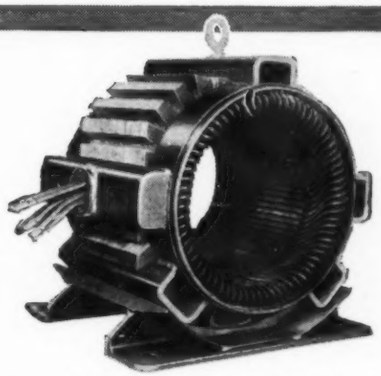
219 WASHINGTON STREET • READING, PA., U.S.A.

Maintenance Costs Go Down and Costly Shutdowns Are Avoided When This Wagner Two-Frame Motor is Put on the Job





The Wagner type CP totally-enclosed fan-cooled motor has two frames: an outer frame that guides a strong cooling draft over the motor, and an inner frame completely sealed against the entrance of dust, fumes, or moisture into the vital parts of the motor.



The heart of the Wagner CP motor is this rugged, all-steel stator, rigidly constructed to meet the exacting needs of modern high-speed production. In larger sizes, the outer surface is deeply grooved (as here shown) to provide ample cooling surface for cool operation. The winding is completely taped well into the slots and all phase coils are insulated from each other by varnished-muslin phase-sheets.

The cost of maintaining open-type motors is likely to be excessive when dust, fumes, or moisture are present. Abrasive, conductive, or explosive dust, corrosive gases or fumes, steam and moisture are destructive to motors and cause frequent motor shutdowns for cleaning and repairing. The way to avoid excessive motor maintenance and production losses during motor shutdowns is to use Wagner type CP totally-enclosed fan-cooled motors which are fully protected against such destructive agencies.

As the upper diagram shows, Wagner type CP motors are self-protected against the entrance of dust, fumes, and moisture, and therefore give uninterrupted service despite severe operating conditions. Experience has proved time after time that motor protection costs less than motor maintenance, that maintenance costs go down, production goes up, and motor worries end when you standardize on Wagner CP motors throughout your plant.

Wagner type CP motors are available in several electrical types, and are but one of a widely diversified line of Wagner motors, all fully described in Bulletin MU-185 free upon request addressed to Wagner Electric Corporation, 6412 Plymouth Avenue, St. Louis 14, Mo.

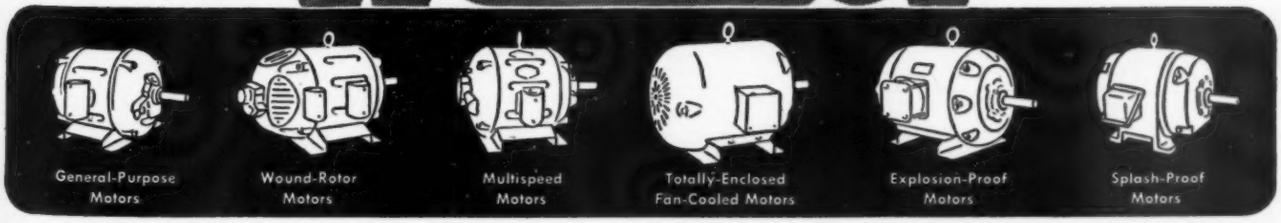
M46-3

Consult Wagner Engineers on all Electric Motor Problems

Electric Motors • Air Brakes • Brake Lining Hydraulic Brakes

Wagner

Transformers • Industrial Braking Systems NoRoL • Tachograph



Sales and Service Branches: ATLANTA 3 • BALTIMORE 18 • BOSTON 15 • BUFFALO 8 • CHICAGO 16 • CINCINNATI 10 • CLEVELAND 15 • DALLAS 1 • DENVER 2 • DETROIT 2 HOUSTON 2 • INDIANAPOLIS 4 • KANSAS CITY 8 • LOS ANGELES 15 • MEMPHIS 3 • MILWAUKEE 2 • MINNEAPOLIS 4 • NEW YORK 7 • OMAHA 2 • PHILADELPHIA 8 • PITTSBURGH 13 • PORTLAND 9 • ST. LOUIS 3 • SALT LAKE CITY 1 • SAN FRANCISCO 3 • SEATTLE 4 • SYRACUSE 2 • TULSA 3 • WASHINGTON 5 • *In Canada:* WAGNER ELECTRIC AT LEASIDE, ONTARIO—*Wagner motor parts are available at 350 Wagner-owned and -contract repair shops.*

FOR
ALL-ROUND EFFICIENCY

Eclipse G-6 is an all-purpose low pressure gun designed to give highest efficiency on the general run of spray operations.

ECLIPSE

For your maintenance painting Eclipse Low Pressure Spray Equipment gives you more coverage per gallon, a remarkable saving in time, power savings because of its Low Pressure operating principle, and the equipment to apply *any* material economically and efficiently.

Eclipse Spray Engineers are at your service for consultation on your spray painting problems. Write today for an Eclipse Engineer. No obligation, of course.

ECLIPSE AIR BRUSH COMPANY
371 Park Avenue **Newark 7, N. J.**

ECLIPSE

either by preventing the installation of a hazard, or by the elimination of a possible accident.

Naturally the plant must have adequate ventilation, lighting, and heat for the area in which it operates and the type of work which is performed, but one of the most important phases which must be considered is that of efficient housekeeping. The plant which is allowed to accumulate debris, creates a spirit in the mind of the employee of carelessness, which affects not only their productive actions but their attitude in which they perform their jobs.

First Aid Facilities

In order to care properly for accidents after they have taken place, and after as much attention as possible has been devoted to their elimination, adequate first aid facilities should be provided. In larger plants, it is believed that a doctor should be in attendance or available for call, upon very short notice. The heart of the first aid system must be the industrial nurses, who by their close contact and immediate availability are prepared to take care of emergencies as they exist. These medical personnel must be provided with adequate first aid equipment, suitable to caring for the emergencies that are probable. Hospitals are not believed required in moderately sized plants in metropolitan areas but adequate means of transportation must be available for the transportation of individuals as required. It is also believed that disaster units which were organized during the war years are not essential except in peculiarly hazardous industries.

All visits of employees, whether caused by accident or illness, to first aid stations are controlled by the issuance of first aid passes by the individual's supervisor, unless the accident or the condition of the employee is too serious to allow for the loss of time involved. These forms are effective controls on the loss of time of the employee and in addition, require that the supervisor immediately indicate what took place if an accident occurred. This form then becomes a minor accident report and enables the compilation of information relative to what occurred immediately after the occurrence when the information is fresh. It also enables us to separate occupational from non-occupational treatments.

In addition to the numerous inspections carried out by the safety organization within the plant, great use is made of outside authorities for technical investigations. If questions arise relative to conditions particularly dealing with industrial hygiene or of occupational disease hazards, competent unbiased

One Name—ALL TYPES

In fact, Phillie Gear was one of the true Pioneers in the design and manufacture of *Speed Reducers, for Industrial Purposes.*

For every conceivable type of Industrial Drive, there is a correct type of Philadelphia Speed Reducer—and by choosing Philadelphia Reducers, you not only secure *Quality Products,* but you place the responsibility for their construction and operation with *one manufacturer* (a point worthy of serious consideration).

ARMY NAVY

Philadelphia GEAR WORKS INCORPORATED

ERIE AVE. AND G ST., PHILADELPHIA 34, PA. NEW YORK · PITTSBURGH · CHICAGO
IN CANADA: WILLIAM & J. G. GREEY LIMITED, TORONTO.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

JOHNSON Wire
SPECIAL ALLOY FINISH
New smooth satin alloy finish—resistant to corrosion and rust—same high physical characteristics as uncoated wire—acts as lubricant reducing tool wear. Withstands 700° Fahrenheit. Here's a major development—a better coating than tin, and no restrictions. Sizes .003" to .080".
.008 ALLOY
Johnson
JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS.
NEW YORK AKRON CHICAGO LOS ANGELES

'WELDED'
TO THE FLOOR
THAT'S WHY . . .
CONTINENTAL "18"
TRADE MARK REG. U.S. PAT. OFF.
THE SUPER FLOOR FINISH
Lasts LONGER
Spot welds form a bond stronger than the metal itself . . . hang together even though the metal is torn apart! Similarly, Continental "18" floor finish lasts longer because it is specially processed to adhere to the floor.
Ordinary floor waxes loaded with resins and other substitutes usually fail because: 1. The solids disintegrate and soon wear out; 2. They cling to the feet (instead of the floor) and soon wear off. Continental "18", made from indestructible carnauba wax uniquely processed to adhere to the floor, will not wear out . . . takes a long time to wear off! Want proof? Send for experimental sample.
CONTINENTAL CAR-NA-VAR CORP.
Makers of Car-Na-Var, Car-Na-Lac, Car-Na-Seal and Other Floor Treatments for Large Floor Areas
1632 East National Avenue Brazil, Ind.

technicians are engaged to survey the question and to report on their findings. The fact that the findings are rendered by independent agencies makes their acceptance by the employees much easier to obtain. Also, if the need should arise in the future, because of a claim for disability involving a particular phase or area, the company is in a position to properly defend an improper claim. If the report indicates that a hazard exists, immediate steps can be taken for its removal.

Since the maintenance of complete medical records is a requirement of the State of New York, an added tool is available to the company to be able to maintain a close watch on those individuals who are organically weak or who are so careless that they have a poor accident record. As soon as the medical department has determined that an employee has an ailment or possible disability which may lead to a potential claim, his supervisor is immediately notified of the limitations so that he may guide himself in his work assignment to prevent further aggravation of the pre-existing disability. All employees are given pre-employment physical examinations to screen out those who may prove to be severe risks in certain types of work.

Few Safety Rules

We have not found it necessary to promulgate and strictly enforce a large number of safety rules. Certain specific isolated practices are forbidden and enforced but the entire program has been built up on the basis of safety consciousness. The supervisors are given safety training courses approximately once each six months, the average course being for about four or five hours. We have tried to instill the thought of working safely in all of the operations being performed within the plant, rather than single out a large number of isolated cases and emphasizing them. In order to develop and retain interest on the part of the supervisors during training, each individual is awarded a distinctive certificate at the conclusion of his course. By concentrating our training in the supervisory group we have been able to expand the normal capacity of our safety department by, in effect, having a junior safety engineer present whenever we have a supervisor directing the working force. In addition, those members of the safety committees who have not been in the safety classes receive training at each of the committee meetings, when specific problems which are causing difficulties are discussed and the recommended method of correction is outlined.

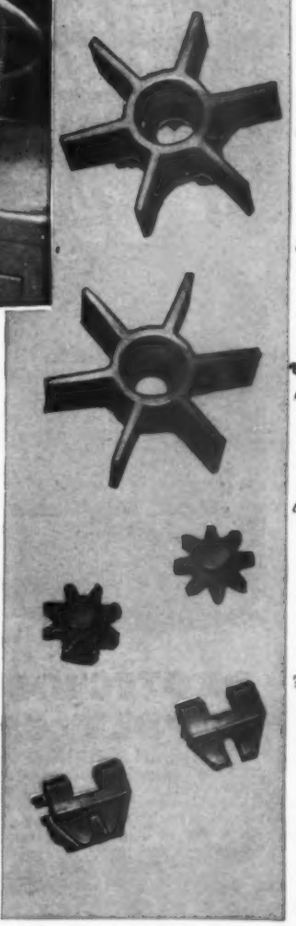
For a brief resume of the results of

MULTIPRESS *Does it Again!*

CUTS COST OF CLEANING CASTINGS

At the **UNIVERSAL CASTINGS CORPORATION**

Small castings of close tolerance are cleaned with low-cost efficiency on MULTIPRESS, with the high accuracy indicated in these "before and after" illustrations.



WITH its remarkably easy and *exact* control of smooth oil-hydraulic power—in amazingly rugged and compact form—MULTIPRESS continues to cut costs, boost output and improve quality on production jobs of every sort.

MULTIPRESS is shown above in action at the Universal Castings Corporation (Capaco Process) in Chicago, where it is specially tooled to clean plaster-molded aluminum, brass and bronze castings. The close tolerances and smooth finish of these castings emphasize the need for precision in the cleaning operation. The firm reports that these MULTIPRESS units have brought marked savings in their cleaning department.

MULTIPRESS users in many other fields have cited facts and figures showing greatly reduced "down time" for maintenance and tooling setups . . . drastic reduction of noise . . . lowered fatigue for operators . . . increased safety . . . lower initial tooling investment . . . important savings in floor space . . . and other production advantages.

A wide choice of models in 4, 6, and 8 ton capacities, with either manual or automatic cycling controls, offer an exceptionally wide range of Multipress ram actions. Standard accessories for further Multipress adaptability include straightening fixtures, extension tables, bolster plates, indexing tables—and the sensational new Vibratory Ram Action, providing short, uniform, closely regulative strokes at frequencies up to 500 per minute!

Write today for latest complete details on MULTIPRESS.

THE DENISON ENGINEERING COMPANY

1154 Dublin Road, Columbus 16, Ohio

FLEXIBLE POWER PLUS ACCURATE CONTROL

DENISON EQUIPMENT for APPLIED Hydraulics OIL

PROTECTOSEAL

PROTECTS! AGAINST FIRE OR EXPLOSION

SEALS! AGAINST LOSS BY EVAPORATION

SAFEGUARDS! HANDLING, STORING, AND DISPENSING

FLAMMABLE LIQUIDS

PROTECTOSEAL SUPPLY CANS

Super-safe and super-convenient with top quality rugged construction. Flexible spout puts liquid where you want it, in a trickle or a full stream, without spilling a drop. The modern, fire-safe, wasteless way to dispense gasoline, naphtha, solvents, and other dangerous fluids. Made in 3-gal. and 5-gal. sizes. Underwriters' approval. *Write for literature.*

THE PROTECTOSEAL CO.
1962 SO. WESTERN AVE.
CHICAGO 8, ILLINOIS

PROTECTOSEAL

THEY SAY AND DO *(continued)*

this effort the following figures will emphasize the value of a comprehensive safety program. The comparison in performance will be made for the year 1941, when the safety program was inaugurated, and the year 1945 to date.

1. The frequency of lost time in accidents per million man hours was reduced from 24.8 to 3.7, a decrease of 85 percent.

2. The severity of lost time accidents in days lost per thousand man days worked was reduced from 0.28 to 0.085, a decrease of 70 percent.

3. The frequency of compensated accidents was reduced from 105.0 to 18.5, a decrease of 82 percent.

4. The frequency of occupational minor accidents has been reduced from 4900.0 to 1016.0, a decrease of 78 percent.

5. The cost per employee for occupational accidents has been reduced from $24.62 to $8.60, a decrease of 65 percent.

By improving the accident experience which we had during 1941 during the direct war period from December 7, 1941 to August 14, 1945, we have been able to save 673,203 man-hours or the equivalent of 337 men working for a period of one year.

* * *

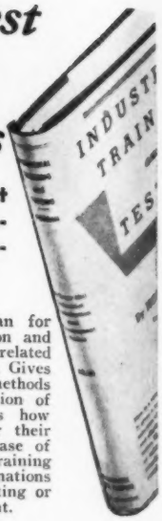
Wage Incentives in a Peacetime Economy

J. K. LOUDEN, Manager of Glass and Closure Production, Armstrong Cork Company, Lancaster, Pa.

Wage incentives, while a controversial management tool by their nature, are an important factor in solving the problems of proper compensation in our peacetime economy. . .

During the war we faced the situation wherein the take-home pay of hourly workers in particular was increased sharply because of longer hours and higher wage rates. This has brought about one of the most critical situations of the reconversion period wherein organized labor is demanding that this wartime take-home pay be maintained while hours are reduced to the pre-war normal work week, claiming that the various companies whose employees it represents have proved by their wartime earnings that they can afford to pay these higher wages for shorter hours and less work. The fallacy of this argument is obvious and yet that does not alter the fact that the demand is present. Regardless of the equity of these demands, we must realize that we are

How to test and train employees



●Workable methods that will reduce cost of turnover and improve production

A simple and workable plan for establishing employee selection and training on a stable, cost-related basis in industrial application. Gives a comprehensive survey of methods and costs for proper selection of suitable workers and shows how to train them efficiently for their jobs. It includes every phase of organizing and operating a training department, with the explanations and examples to aid in creating or improving such a department.

Just Published

INDUSTRIAL TRAINING and TESTING

By HOWARD K. MORGAN

Director of Engineering, Transcontinental and Western Air, Inc.,

McGRAW-HILL INDUSTRIAL ORGANIZATION AND MANAGEMENT SERIES

225 pages, 5⅝ x 8¾, 20 charts and forms, $2.50

Here is a testing and training plan that stands up—that gives plain-to-see savings in turnover costs, besides producing better results for you every day, through the medium of a more capable, efficient work force. Concisely, concretely, this new book tells you *what this plan is* and *how to use it.* From an indication of the actual savings possible with this plan to the complete organizational and follow-up methods that start it and keep it working, the things you'll want to know are plainly covered. Put these methods to work for you, *whether your problem is shop, service, sales, or supervisory training.*

Get a quick grasp of such important essentials as:

—a method of justifying the funds necessary for training
—how to test new employees, with specific, well-chosen tests
—complete training organization, with duties and responsibilities clearly outlined
—methods of instructing, for the major divisions of industrial training, including sales, service, supervisory, instructor, introductory, and shop courses
—a complete follow-up record and evaluation system

Now, particularly, in changeover from a period of special devices and emergency measures, it may pay you well to check your testing and training methods against the modern approach and practical plan given in this book. See the book 10 days on approval. Simply send this coupon.

McGraw-Hill Book Co., 330 W. 42 St., N.Y.C. 18

Send me Morgan's **INDUSTRIAL TRAINING AND TESTING** for 10 days' examination on approval. In 10 days I will send **$2.50**, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

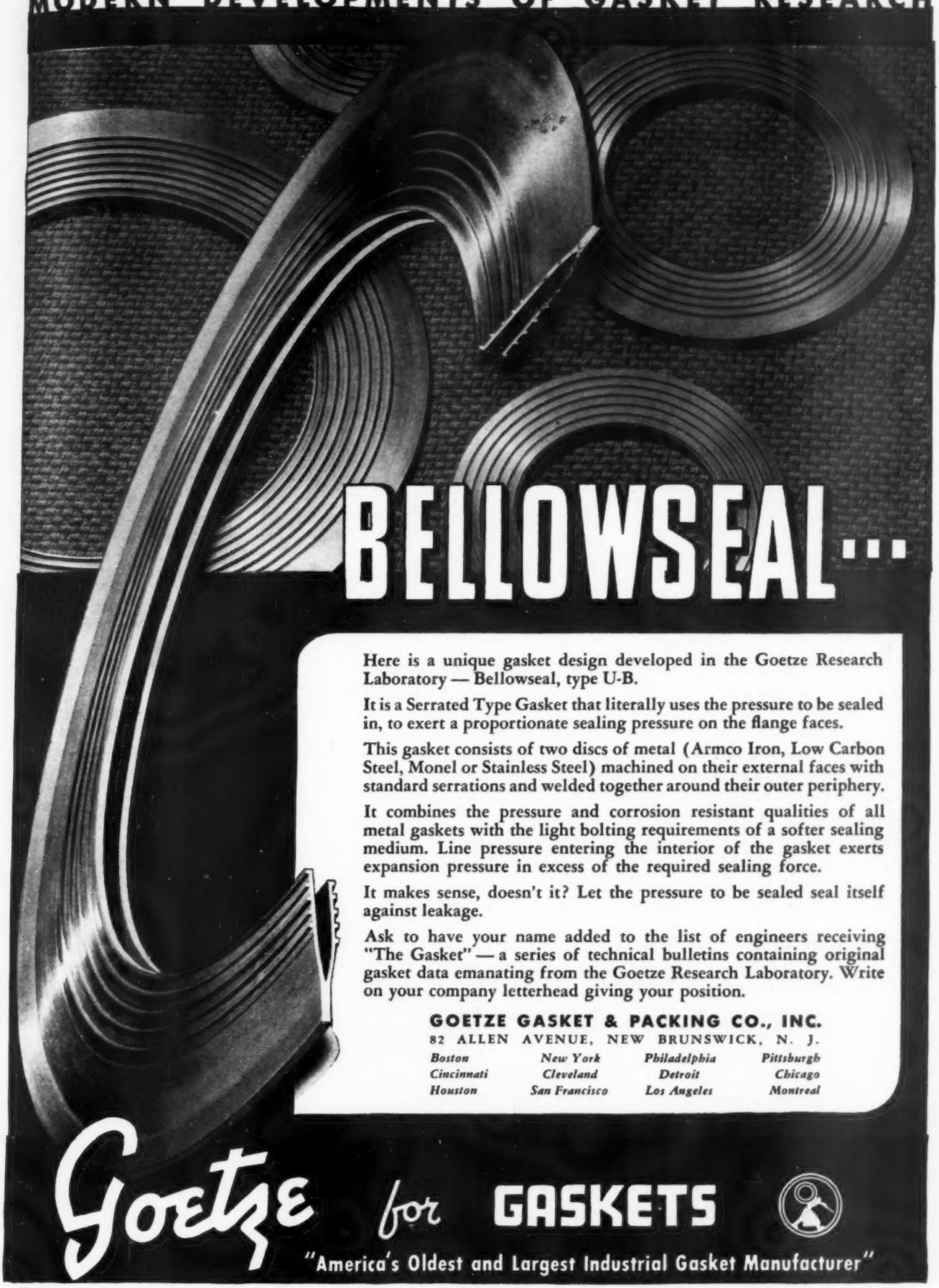
City and State .....

Company .....

Position ..... Fac. 1-46

In Canada: Mail to Embassy Book Co., 12 Richmond St. E., Toronto, 1

MODERN DEVELOPMENTS OF GASKET RESEARCH



BELLOWSEAL...

Here is a unique gasket design developed in the Goetze Research Laboratory — Bellowseal, type U-B.

It is a Serrated Type Gasket that literally uses the pressure to be sealed in, to exert a proportionate sealing pressure on the flange faces.

This gasket consists of two discs of metal (Armco Iron, Low Carbon Steel, Monel or Stainless Steel) machined on their external faces with standard serrations and welded together around their outer periphery.

It combines the pressure and corrosion resistant qualities of all metal gaskets with the light bolting requirements of a softer sealing medium. Line pressure entering the interior of the gasket exerts expansion pressure in excess of the required sealing force.

It makes sense, doesn't it? Let the pressure to be sealed seal itself against leakage.

Ask to have your name added to the list of engineers receiving "The Gasket" — a series of technical bulletins containing original gasket data emanating from the Goetze Research Laboratory. Write on your company letterhead giving your position.

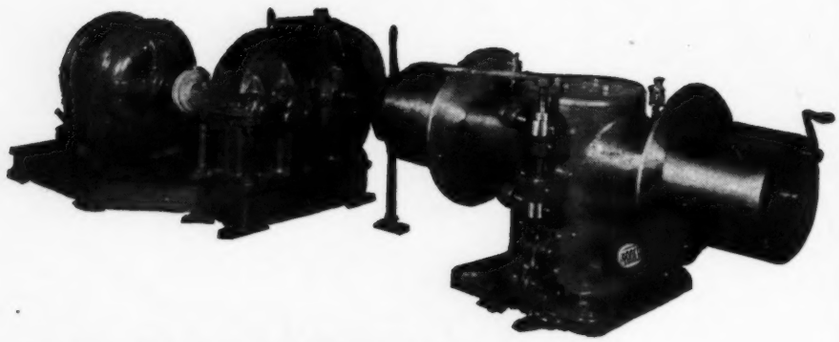
GOETZE GASKET & PACKING CO., INC.
82 ALLEN AVENUE, NEW BRUNSWICK, N. J.

Boston	*New York*	*Philadelphia*	*Pittsburgh*
Cincinnati	*Cleveland*	*Detroit*	*Chicago*
Houston	*San Francisco*	*Los Angeles*	*Montreal*

Goetze for GASKETS

"America's Oldest and Largest Industrial Gasket Manufacturer"

COIL HANDLING



EQUIPMENT By *Yoder*

Development of coiled strip in a constantly increasing variety of widths, gauge and material has been an important factor in the advancement of high speed production in stamped, punched, drawn and roll-formed metal products. Yoder has specialized in the engineering and building of special handling equipment from the early days of strip making.

Today Yoder builds coil handling equipment as varied as industry's needs, from simple ball-bearing coil boxes to cone type uncoilers with drag generators and from simple stock reels to huge tension reels for steel mill use. The patented double-swivel type recoiler, shown above, handles single or multiple coils up to 6000 pounds, is made so that coils can be unloaded from one side while the other is recoiling . . . The coil box at right is the simplest form made, ball bearing, easy to load, compact, suitable for serving a wide variety of strip-fed production machines. There are many other types.

These machines may be had with Yoder pinch-roll feed stands, levellers, edge trimmers or as integral parts of complete Yoder-built slitting or roll-forming lines. If your coil handling need is special, Yoder can engineer a unit for you, based upon the most complete experience in the industry.

For engineering consultation or product information write to

ENGINEERING YODER MANUFACTURING

The YODER COMPANY

METAL WORKING PRODUCTION MACHINERY

5524 Walworth Ave. • Cleveland 2, Ohio

going to pay at least as high hourly rates now as we did during the war, and ways and means will have to be found to protect in part the take-home pay of the workers.

The obvious answer is that each plant must determine for itself what it can afford to do. This will vary widely depending on the margin of profit that exists for the product the company manufactures, plus the percentage that labor represents of the total cost of manufacturing that product. In every instance, though, it means that management must seek every way and means it can to reduce its costs in order to meet in part these demands for higher wages.

An Equitable Device

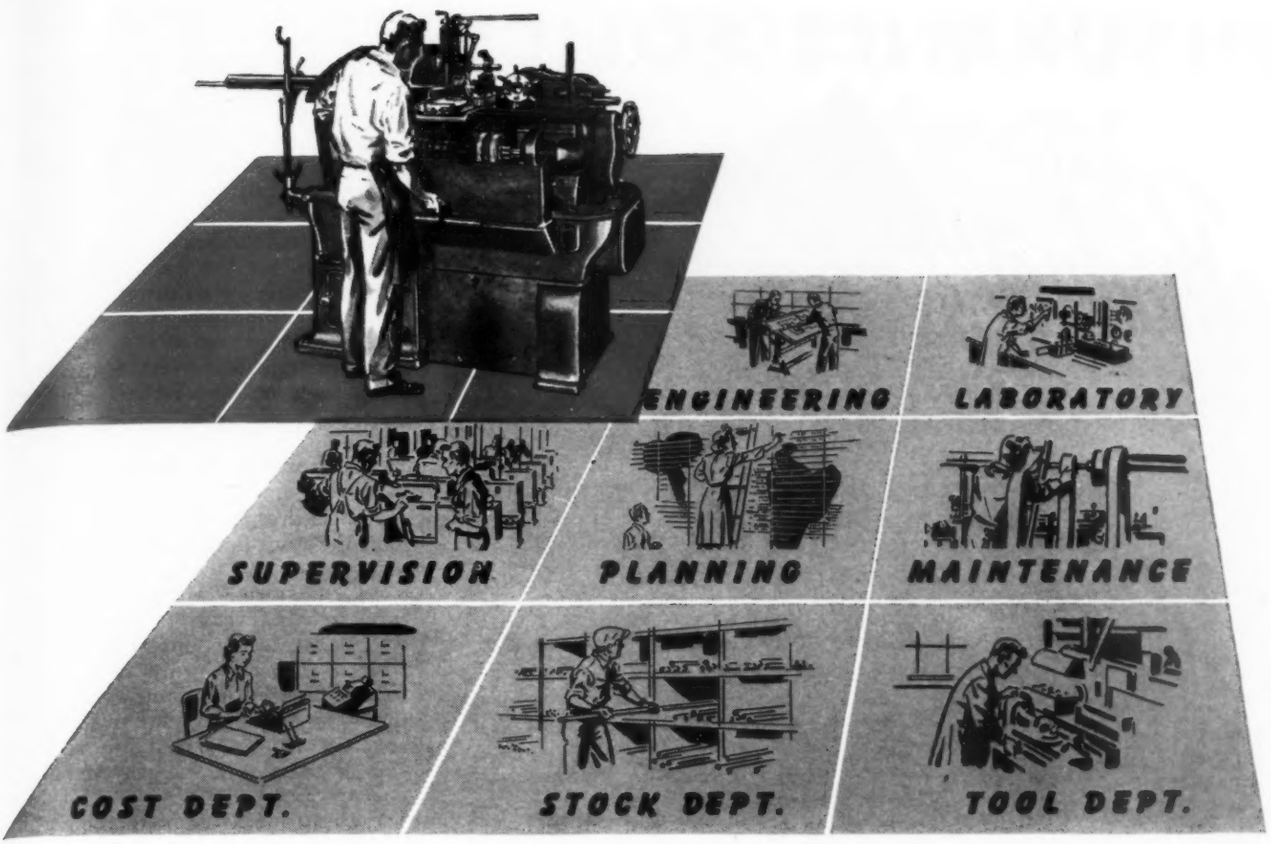
There can be no objection to the principle of increasing wage rates, because we all know that the only real ceiling that should exist on wages is our ability to earn them. If we accept this principle, then we must recognize that a sound wage incentive system is one of the most equitable devices that will permit increasing take-home pay while at the same time at least maintaining unit cost and, in most cases, play a part in reducing costs.

Before we discuss this problem more specifically, I think we should define what we mean by wage incentives. There are many definitions, but I think that for our purpose we can state that the fundamental purpose of an incentive system is to offer a financial incentive to a worker, or group of workers, to produce work of an acceptable quality over and above a specified quantity. Obviously our problem. insofar as the use of wage incentives is concerned, rests primarily in the "specified quantity" and secondarily in the "specified quality". . .

The attitude shown toward wage incentives as a wage payment device by both organized and unorganized labor varies all the way from a refusal to permit their use to whole-hearted acceptance.

Regardless of the social and economic problems we face and the confusing issues that may arise from them, we must keep before us the fact that the true wealth of a nation rests in its ability to produce. Therefore it is our responsibility as citizens and as members of management to do everything we can to prevent harming our great heritage. We must, within our own realm, and in working together with labor, find ways and means of breaking down this restriction of production on the part of organized labor wherever it exists.

The second major area for opposition to the use of wage incentives by labor



ONLY A FEW SQUARE FEET IN YOUR PLANT

. . . but they cast a Mighty Shadow

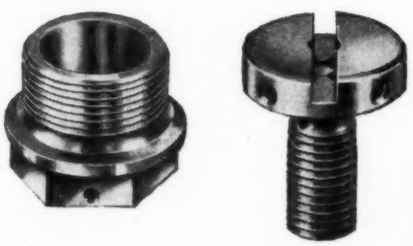
It's dollars to doughnuts you don't make your own machine screws! So why try to make your special production parts?

True — you can. All you'll need is a few automatics with special tools, some trained operators and supervisors, an expediter, and extra assignments for your tool room, engineers, maintenance crew, drafting room, stock clerks, purchasing department . . .

Every foot of space in your plant casts a mighty shadow: *Overhead*, which can be covered only by producing more finished goods that look better, are better, and can be sold for less money at a satisfactory profit. Don't let your production space cast a shadow over profits! Use every foot to make those things you're geared up to make . . . and let Corbin Screw produce your small parts.

You'll get "Blueprint-plus" in accuracy and finish, because Corbin M3 Facilities are geared up to turn out your special production parts efficiently. We have the Men, the Materials and the Machines to head, grind, roll thread, turn and shape these pieces accurately, economically . . . *and on schedule.*

P-1



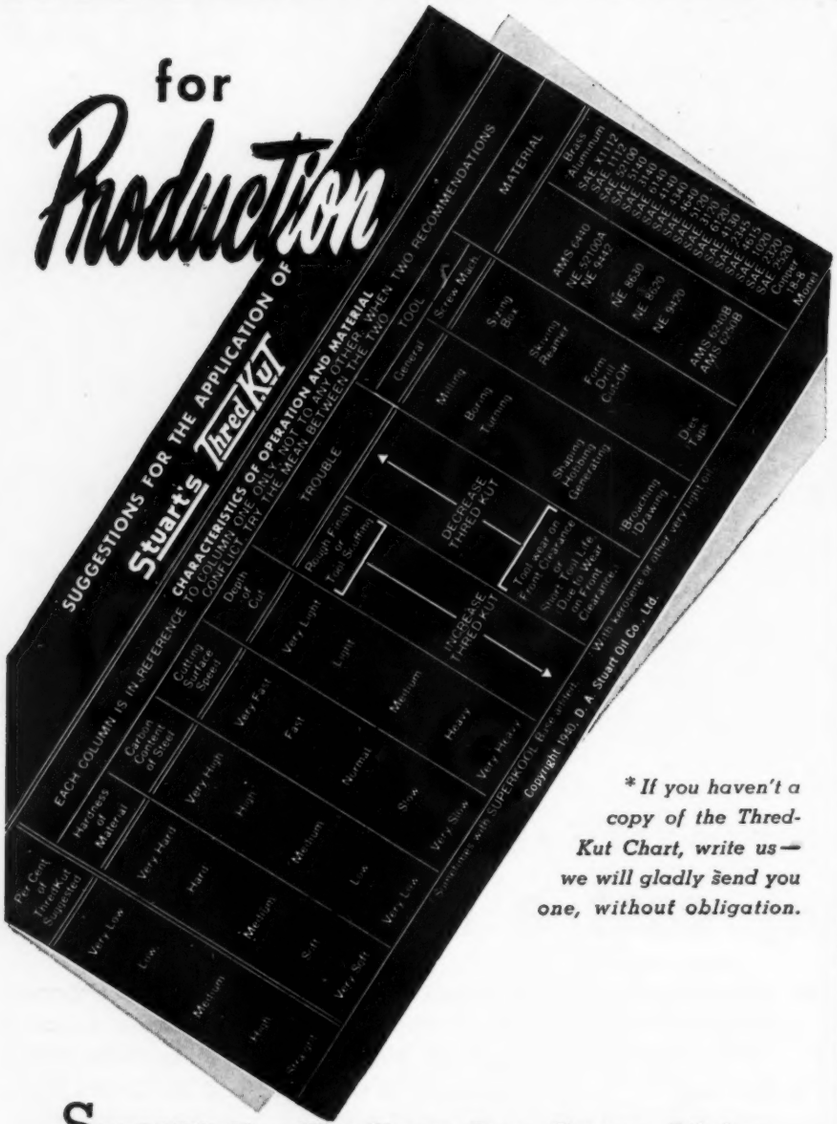
CORBIN SCREW DIVISION
The American Hardware Corporation
NEW BRITAIN • CONNECTICUT
Warehouses:
New Britain • New York • Chicago

CORBIN Production Parts

COME TO "CORBIN SCREW" FOR PROFITABLE

INSURANCE POLICY

for *Production*


SUGGESTIONS FOR THE APPLICATION OF
Stuart's ThredKut
CHARACTERISTICS OF OPERATION AND MATERIAL
EACH COLUMN IS IN REFERENCE TO COLUMN ONE ONLY NOT TO ANY OTHER. WHEN TWO RECOMMENDATIONS CONFLICT TRY THE MEAN BETWEEN THE TWO
MATERIAL
TOOL
TROUBLE
DECREASE THRED-KUT
INCREASE THRED-KUT
Copyright 1960 D. A. Stuart Oil Co., Ltd.

** If you haven't a copy of the Thred-Kut Chart, write us— we will gladly send you one, without obligation.*

STUART'S ThredKut Heavy Duty Cutting Oil has played an important part in solving many of industry's toughest metal working problems. Reference to the time-tested ThredKut Chart* has insured the proper application of this versatile product in many production emergencies. Alert production executives will find these aids of great help in answering troublesome metal-working problems. D. A. Stuart Oil Co., Ltd., 2735 N. Troy Street, Chicago 23, Illinois.

D. A. Stuart Oil CO.
LIMITED
ESTABLISHED 1865
Stocks in Principal Metal-Working Centers

rests primarily on their unhappy experience with various wage incentive plans and installations in the past. The basis for this opposition in large part rests in management's past actions and concepts of the use of this tool. Its solution rests in management's ability to face the issue squarely, realize what constitutes a sound basis for the use of incentives, and the degree of its determination to eliminate any misuses of incentives in its establishment, or if it is an initial installation, to make certain that it is being made on a sound and equitable basis.

Problem Needs Study

If incentives are not in use in a plant, then the ready means to increase take-home pay from 20 to 30 percent is at hand. However, where management turns to this device as a ready and easy solution to its wage problems before it truly understands its use and is ready to install incentives on a sound basis, then it is laying the pattern for resistance that is very difficult to overcome.

Exactly this situation occurred at the conclusion of the First World War and I am very much afraid that the hasty use of incentives during this last war has in many cases caused the same damage. Wage incentives are not a panacea and they in themselves are not the end we are seeking, but when properly used they are definitely a means to the end of increasing productivity, paying higher wages, and reducing costs. . . .

The evils that existed in the use of incentives, particularly during the period of 1915 to 1930, and their effect on forming the opinion of workers on the use of incentives, are facts we must face and face realistically if we are going to overcome them. It is not sufficient to say that our policies are now equitable and should be accepted with full faith by our workers. We must be ready to prove our policies to our people in practice before we can expect them to accept them in full faith. They, in turn, must be willing to give them a fair trial. . . .

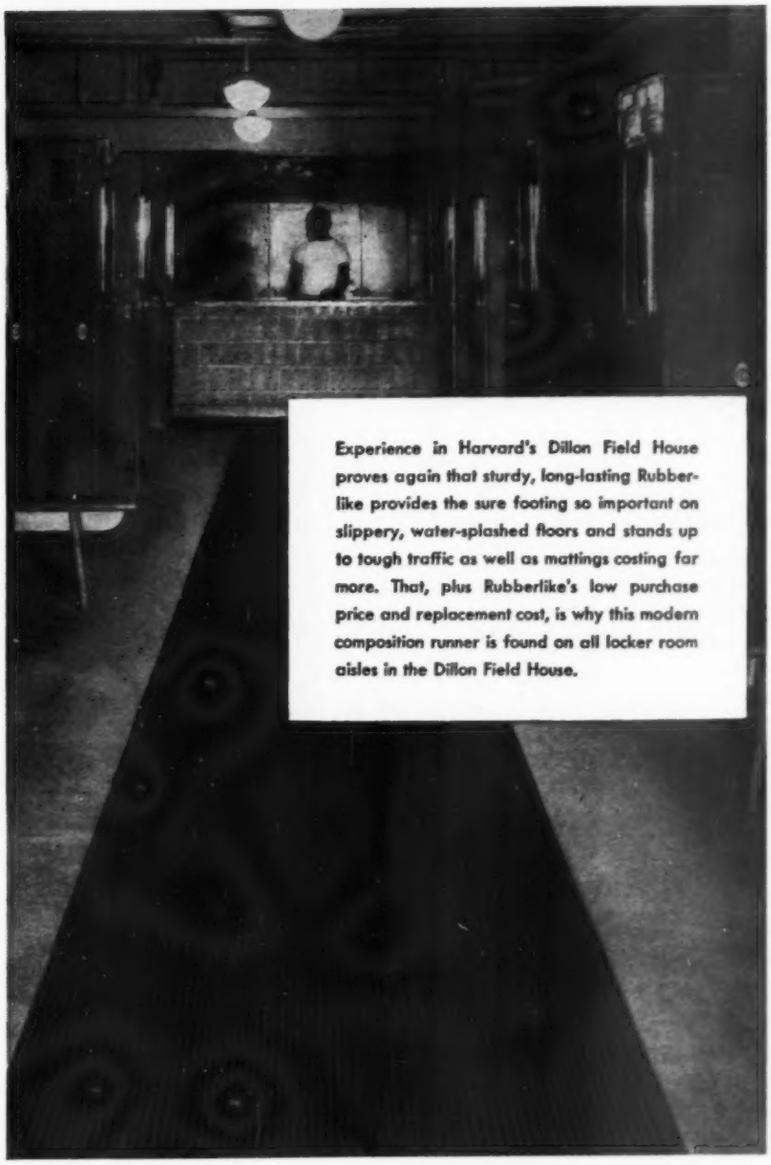
As far as the incentive plan itself is concerned, it must be tailored to meet each situation. There is no one plan that is universal in its application in all its details. Therefore without attempting to discuss any particular type of plan, let us consider some of the features and requirements that can and should be used as measuring sticks of the desirability and completeness of any plan that may be developed.

1. The plan should reward the employee in direct proportion to increased output. Justly or unjustly, the worker

RUBBERLIKE FLOOR RUNNER MEETS "torture test" AT HARVARD UNIVERSITY

Tracked-in water makes floors dangerously slippery in Harvard's Dillon Field House where cleats and spikes put floor mattings through a torture test that means frequent replacement. After much experimenting, Harvard maintenance men installed Rubberlike, a floor runner that meets this torture test as well as mattings costing many times as much. What's more, non-skid Rubberlike gives safe, sure footing because water doesn't make it slippery. And Rubberlike provides this practical protection for LESS THAN 6c PER SQUARE FOOT—a fraction of what most mattings cost.

But economy is only one advantage. In thousands of tough traffic spots—schools, hotels, institutions, restaurants, factories, offices—Rubberlike makes worn floors safer, keeps good floors looking better. Sturdy corrugations cushion and quiet footsteps, speed cleaning. Rubberlike hugs any surface without cementing. Won't curl at the edges. Made in handy 36" width, 25 yards to the roll. Order from your supply house or write for free sample to Bird & Son, inc., Dept. 61, East Walpole, Mass.



Experience in Harvard's Dillon Field House proves again that sturdy, long-lasting Rubberlike provides the sure footing so important on slippery, water-splashed floors and stands up to tough traffic as well as mattings costing far more. That, plus Rubberlike's low purchase price and replacement cost, is why this modern composition runner is found on all locker room aisles in the Dillon Field House.

THE 10-SECOND STORY OF

RUBBERLIKE*

WATERPROOF · HEAVY DUTY · NO SPECIAL UPKEEP
SKID-PROOF · QUIETS TRAFFIC · HUGS ANY FLOOR
EXTRA RESILIENT · NO CEMENTING NECESSARY
LOW COST · LONG LIFE · PRESERVES FLOORS
*Reg. U. S. Pat. Off.

SINCE 1795

Men who know the best know

BIRD

ASPHALT SHINGLES · INSULATED SIDINGS · INSULATION BOARDS
FLOOR COVERINGS · WALLBOARDS · BUILDING PAPERS
RUBBERLIKE FLOOR RUNNERS · INDEX PRESSBOARDS · SHIPPING CONTAINERS
SHOE CARTONS · BUILT-UP ROOFS · BIRD-FIBRE WOOD FRAME CASES

BIRD & SON, inc., East Walpole, Mass. · NEW YORK · SHREVEPORT, LA. · CHICAGO, ILL.

does not like to share the direct result of his greater output. The worker feels that fair standards should be established and once he meets and exceeds those standards he should receive the full benefits therefrom. Thus any part-payment is faulty in this respect. This is a logical conclusion, not only from the viewpoint of the worker but also of the management. In my opinion the day of the so-called "split plans" is past.

2. The plan should be understandable and easily calculable by the employee. Any plan that is not understood or easily figured by the worker is looked upon with disfavor and distrust. Any plan, no matter how complex or how simple, that is designed to limit earnings will finally be detected with most unfavorable results.

3. Hourly base rates should be guaranteed. Since a wage incentive plan is designed to offer a financial incentive for a worker to produce work of an acceptable quality over and above a specified quantity, it presupposes that the worker will be fairly and adequately compensated for his efforts and output up to and including that specified quantity. This base rate is the one established by job evaluation and is in accordance with the rate structure and is not an arbitrarily chosen lower rate. There should be but one base rate for a job regardless of whether or not it is on incentive. While there should be enough spread between the guaranteed base rate and the normal earned rate to provide incentive to extra effort or sustained effort, this can be too large as well as too small. When too small, the incentive to produce is lacking; when too large it may be ineffective because the reward for increased output starts before the increased output is discernible. What this spread should be is largely a matter of opinion. I would recommend that it be 25 percent, with 20 percent the minimum acceptable spread, and 30 percent the maximum desirable spread.

4. It should provide enough of a guarantee of standards to give the worker a feeling of security. The standard must be guaranteed against any change except where there has been a definite change in methods, tools, equipment, specifications, or materials that affect the rate of production. This guarantee must be meaningful and strictly adhered to and when such a change is measured, only that portion of the standard directly affected should be changed.

5. Definite instructions covering policy and methods should be provided. Management must unfailingly define and establish policies as to what it will and will not do, and what employees

How Would You Like it

IF APPLES WERE PRICED LIKE SCREWS?

Inconvenient—to say the least! Why should you have to figure out a complicated string of discounts to arrive at your Net price for *fasteners*?

STRONGHOLD SCREW PRODUCTS

QUOTES NET PRICES!

You can tell at a glance *exactly* what you pay when you order STRONGHOLD Screw Products. Send for copy of our "Net Price Catalog." It is an up-to-date fastener encyclopedia, reference guide, specification chart, and NET price list of precision-made STRONGHOLD products. Every purchasing agent and every engineer who specifies fasteners should have a copy.

MANUFACTURERS SCREW PRODUCTS
308 W. Hubbard St., Chicago 10, Ill.
It's Faster to Phone—WHitehall 4680
Standardize on STRONGHOLD

Paste This Coupon on Your Letterhead and Mail!

MANUFACTURERS SCREW PRODUCTS
308 W. Hubbard St., Chicago 10, Ill.
Please send me a copy of the new STRONGHOLD "Net Price Catalog."
NAME .....
POSITION .....
COMPANY .....
ADDRESS .....
CITY, ZONE, STATE .....
☐ Check here if you would also like a free copy of our "Pocket Library of Engineering Data," a handy, fingertip reference to technical information every user of fastener products should have.
☐ Please send a few samples of your products.
☐ Please quote prices as per attached request.

Can* FOREMAN *and* STEWARD *pull together?

This book shows how they *can*—and why it is to the best interests of management and employees—
It tells the foreman where he stands—what he should do and what he shouldn't do—and how best to get his job done while *building and maintaining smooth relations with the steward*—
It is the first book to bring the foreman practical methods aimed directly, plainly and simply at the critical and important area of his daily bargainings with the steward—

Just Published

WHEN FOREMAN AND STEWARD BARGAIN

By GLENN GARDINER
Vice President, Forstmann Woolen Company

194 pages, 5⅝ x 8¼, $2.00

This book helps the foreman play his important part in collective bargaining, at the front-rank position of contact with the union steward. It helps him understand his own and the other fellow's position so that mutual respect and cooperation may be built up. It explains what unionization means and how it affects him as a part of management. It provides him with the practical methods for all sorts of situations, that will help him preserve his prestige and maintain production standards, while effectively dealing with the many day-to-day bargaining problems he encounters.

Get the facts, pointers, methods you need from 21 practical chapters dealing with:

—rights and duties of the union steward
—foreman's responsibilities under the Labor Relations Act
—how the foreman can maintain proper prestige
—how to win the steward's confidence and cooperation
—what tactics to use to maintain discipline
—how to get the steward's help in maintaining quality
—how to get the steward's help in dealing with problem employees
—12 ways to prevent the development of grievances
—how to receive a grievance from the steward
—how to handle a grievance
—how to say "no"
—when an unsettled grievance should be sent higher up
—how to make a grievance report
—helpful records for foremen
—how to deal with an antagonistic steward, etc., etc.

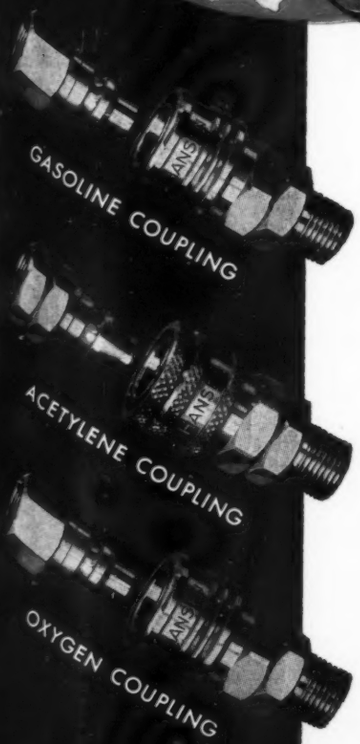
Recommended by the McGraw-Hill Industrial Organization and Management Series Committee

See It 10 Days Free—Send Coupon

McGraw-Hill Book Co., 330 W. 42 St., N. Y. 18
Send me Gardiner's **When Foreman and Steward Bargain** for 10 days' examination on approval. In 10 days I will send **$2.00**, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....
Address .....
City and State .....
Company .....
Position .....Fac. 1-46
(In Canada: Mail to Embassy Book Co., 12 Richmond St. E., Toronto 1)

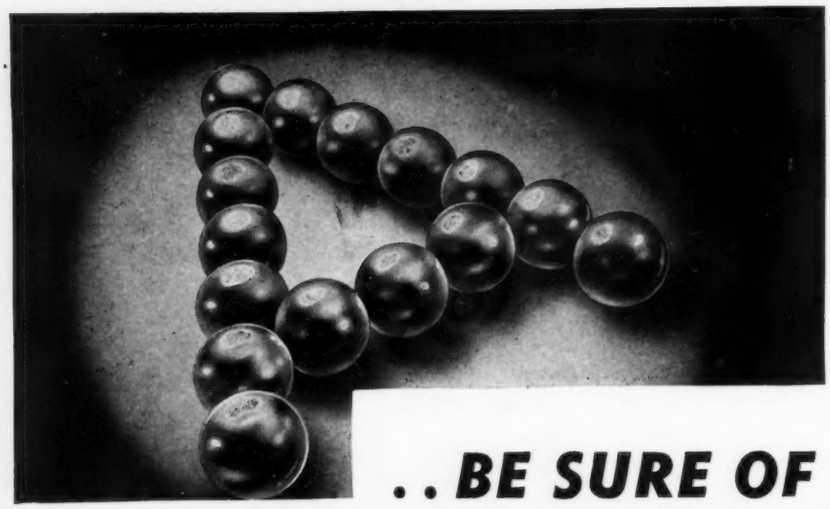
HANSEN COUPLINGS



THERE ARE DEFINITE REASONS for the world wide popularity of Hansen couplings. Performance is what put them on top and this same remarkable performance is what is keeping them there. Make no mistake about this — no coupling on the market has the all 'round advantages of Hansen Coupling's. In buying, sound decisions rest on facts, check over these facts on Hansen Push Tite coupling before purchasing any coupling. It is compact, sturdy with all moving parts protected—it will and can take rough going. Its remarkable ABC simplicity in operation is unique. Simply push plug into socket, it is connected, air is automatically turned on. To disconnect merely slide sleeve back with thumb, it is disconnected and air is automatically turned off. No twisting or turning to connect or disconnect, no kinking of hose due to swivel action. It will take pressures as low as a couple of ounces up to a peak of over 10,000 pounds without leaking. No other coupling can match these features. There's a Hansen coupling made for air, oil, grease, oxygen, gasoline and acetylene and they come in a wide range of sizes. • • • Send for free industrial catalogs.

THE HANSEN MFG. COMPANY

1786 EAST 27th STREET • CLEVELAND 14, OHIO

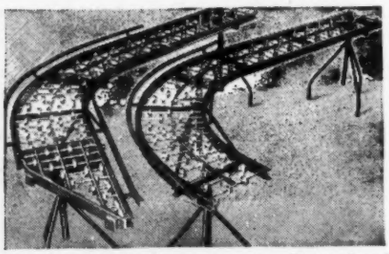


..BE SURE OF UNINTERRUPTED PERFORMANCE

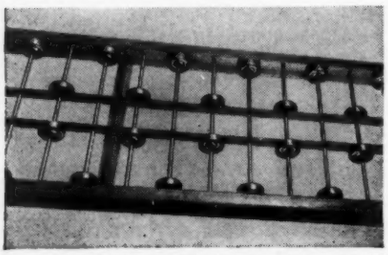
CARRY THE LOAD AS PLANNED
SPECIFY "ABBOTT"

ROLL ON ABBOTT Bearing BALLS
THE ABBOTT BALL COMPANY HARTFORD 10, CONN. U.S.A.

NOW--MOVE YOUR CASES AND BOXES BY GRAVITY!



Left: Special Speedcurve Junction. Right: Standard 90° curve—Model 15-SW-10. Note guard rails and adjustable stands.



Model 15-SW-8 available in 5' and 10' straight sections, 45° and 90° reversible arms.

SPEEDWAYS CONVEYORS are used daily by factories, warehouses, etc. to move cases, cartons, crates, boxes—
QUICKLY! SAFELY! EFFICIENTLY!

Low cost SPEEDWAYS *gravity*, wheel-type CONVEYORS cut handling costs. Save time and and labor! — Lightweight and sturdy — adjustable to almost any material handling job — sections interlock (no tools required for installation).

Portable or permanent installations. Write today for details.

IMMEDIATE DELIVERY of 5' and 10' straight sections; 45° and 90° reversible curves; adjustable stands! Special Models from 4½" to 20" wide and as many as 6 to 24 wheels per foot.

AGENTS AND STOCK IN PRINCIPAL CITIES

SPEEDWAYS CONVEYORS, INC.
3076 Main St. Buffalo 14, N. Y.

may and may not do. A weak or vacillating policy or group of policies can do irreparable damage in all phases of wage administration. In all cases where the line is not clean cut as to what is fair, rule in favor of the worker.

6. Shop procedure should be standardized. This includes material and equipment requirements, clean-cut specifications, production control, and standard operating instructions, in addition to the other phases of good shop control.

7. Measured standards must be based on definite quality requirements, with proper and direct controls placed over waste. This is an essential factor in the development of any standard and must be clearly and specifically set forth, with definite methods of measurement given.

8. Equitable adjustment for failure to meet the task when the cause of the failure is beyond the employee's control should be provided. By placing the responsibility for each failure where it belongs, management not only indicates its fairness to labor but also focuses attention on organization weakness and insures the institution of corrective measures.

9. Once production is such that bonus is earned, unit costs should be constant. This is particularly desirable from a cost and budget standpoint.

10. To be effective the plan must be rigidly maintained. The most essential practice in the operation of any incentive plan is its maintenance.

Let us now discuss the reactions of workmen to technological change, wage incentives, and measured output in general. . . .

When we stop to analyze the single greatest element in employees' resistance to wage incentives and technological change, we find it to be fear. This fear takes many turns but all of them are surmountable and removable.

Analyzing this fear, we find that it is the unknown elements, the mystery that so often in the past surrounded this work, that are largely responsible for it. Workmen have a right to be and want to be "in the know" regarding anything that vitally affects them. Therefore it should be a fundamental policy that before any work is done the workers be fully informed about what is to be done, how it is to be done, and the goal set. Furthermore, as each step is taken, it and its results should be fully discussed with them and progress be made only as fast as the workers can absorb and assimilate it. . . .

The degree of acceptance of technological change and wage incentives can

Aluminum, newly reduced from its ore, looks like this to the spectrograph.

"PORTRAIT OF A Spark"

WITH A STORY

Strike an electric arc on aluminum as it comes from Alcoa's reduction pots, and this is what the spectrographic camera records. Every significant element in the metal is exposed for examination.

Thus aluminum, new-born, faces the glaring light of Alcoa inspection for the first of many times —Alcoa Quality Control at work for you. Analyzed in this manner and graded, that lot of aluminum is allowed to leave the reduction plant.

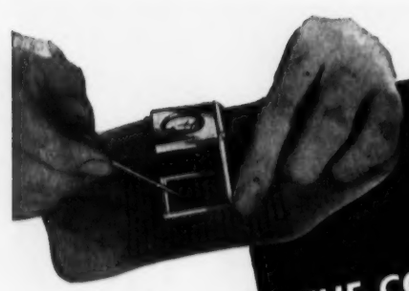
All this checking and double checking in Alcoa plants has an effect on your production. Operations move along more smoothly. Quality is higher. Costs are consequently lower.

Quality Control is an extra you get when you specify ALCOA ALUMINUM.

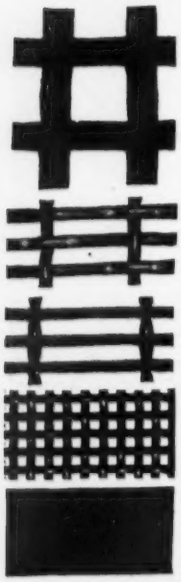
ALUMINUM COMPANY OF AMERICA, 2126 Gulf Bldg., Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM



How to make certain that you're getting THE CORRECT WIRE CLOTH



There are too many mesh sizes, wire gauges, weaves and metals in use that are *nearly* right . . . and "nearly right" is often a long way from top efficiency and long life.

Wire cloth can and should be fabricated to meet requirements accurately and precisely. There are specific formulae for determining your needs for a particular operation or service. Likewise there are specific metals to resist conditions of wear, abrasion, corrosion and high temperature.

"Buffalo Wire" users are able to obtain not only such invaluable information, but more importantly to obtain their *exact wire cloth requirements*. The magnitude and variety of the "Buffalo Wire" line make this possible.

MOST HELPFUL BOOK EVER PUBLISHED FOR WIRE CLOTH USERS
Catalog No. 13
MAILED WITHOUT CHARGE

MANUFACTURER OF ALL TYPES OF WIRE CLOTH FOR OVER 75 YEARS

Buffalo WIRE WORKS CO., INC.

440 TERRACE BUFFALO 2, N. Y.

Saws Dull in 2 Hours— FOLEY-FILED in 7 Minutes!

"We have been using our Model F-16 Foley Filer daily and it is doing a grand job. Our work today is producing Fairlead assemblies for aircraft. We are using laminated bakelite material, and cutting with hollow ground circular saws. "Two hours is as long as saw will stand up cutting this material. We were paying $1.00 per dressing to have our saws sharpened. Your automatic filer runs around these saws twice in seven minutes, so it is not difficult for you to see how pleased we are with our purchase."

Yours "V" truly,
J. M. King Manufacturing Co., Inc.
Philadelphia, Pa.

Here's Tough Sawing and FAST FILING!

The FOLEY AUTOMATIC SAW FILER in this case is saving a saw filing cost of $1.00 per saw every two hours of use. Its accuracy and speed in filing and automatically jointing a saw in one operation cannot be duplicated by hand.

Have You a Tough Sawing and Filing Problem in YOUR Plant?

With Foley filed saws every tooth is of equal size, height and spacing—saws cut much faster, truer and smoother—do 25% to 40% more work. Foley-filed saws stay sharp longer—filing time is reduced and saw breakage prevented. The Foley Saw Filer sharpens band saws, cross-cut circular saws, hand saws.

30 DAY TRIAL OFFER

We offer the privilege of a 30-day trial on your own work. Write for literature and details of this offer.

FOLEY MFG. CO. 45 Second Street N. E., Minneapolis 13, Minnesota

be measured almost in direct proportion to the degree of success the management of a company has in developing and establishing policies that meet and overcome these natural fears on the part of workmen.

Therefore, before any industrial engineering work is done, general management must have its policies and thinking concerning the program and its results well in hand before the program is started. It must be prepared to express and discuss its policies with the employees in a clear and concise manner before any actual work is done. . . .

I am certain that if a management would develop these and other policies to fit its particular needs, live up to them, and make them live, vital things, that it would find its employee relations rising to a much higher plane, and much of the resistance to technological change and wage incentives will disappear.

The New Trend

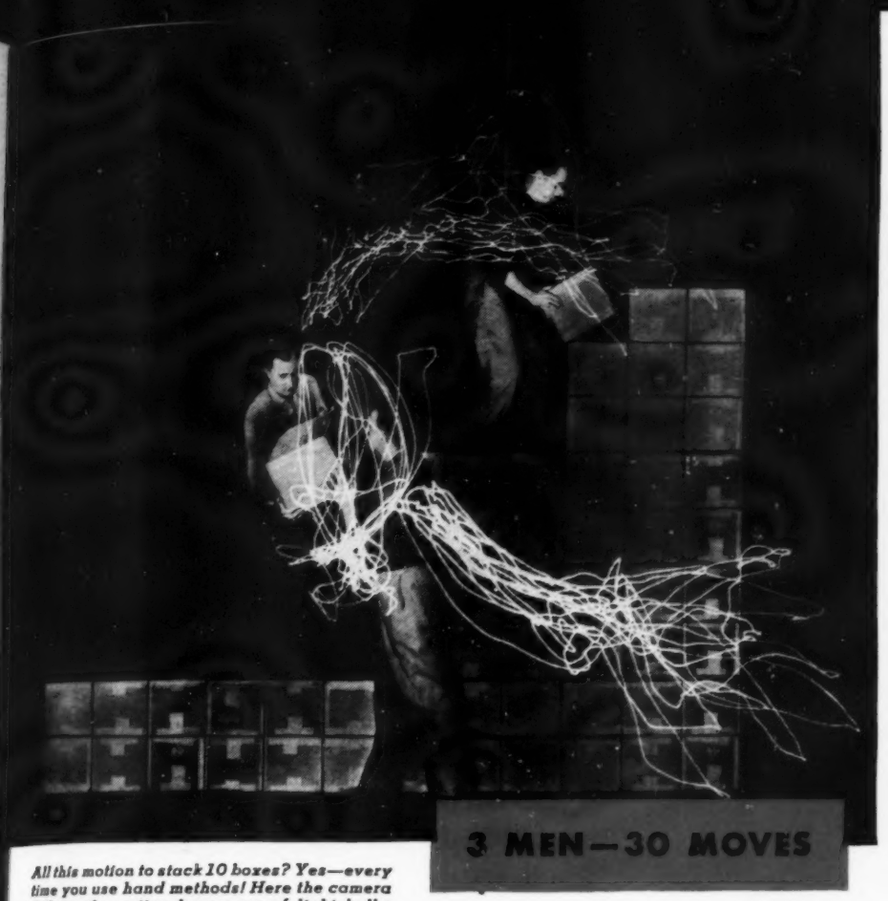
A phenomenon of unknown portent has entered the industrial picture the past decade. This condition is the marked trend towards union participation in fields of industrial management heretofore considered to be exclusively the province of the managers of the business. Many unions are militant in their demands for an equal voice, or at least a veto voice, in the features of a business that directly affects them, such as rate of output, rates of pay, working conditions, and the like.

When we are discussing wage incentives we must include an analysis of this matter of union participation in the setting of standards and developing wage incentive plans.

In considering a basis for union participation in the development and institution of such projects as a wage incentive system, there are certain fundamental concepts of responsibility and authority that must underlie this relationship and must be fully considered.

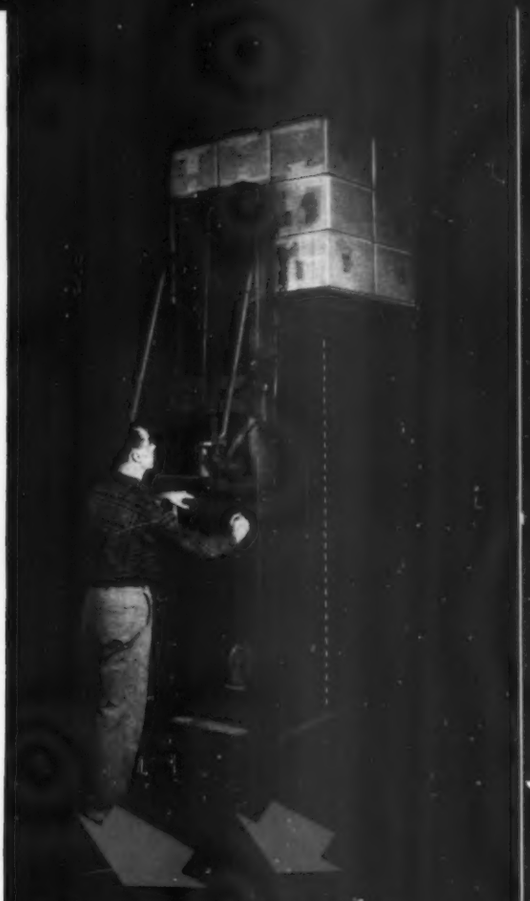
These are in addition to the mutuality of interest and personal attitudes, concepts, and policies that provide a proper, broad, general basis for a satisfactory relationship. These concepts are not affected by the degree of participation decided upon but again are fundamental. These are:

1. The final power of decision must rest with management. Management, if it is successful, must protect and foster the interest of both the employees and the owners of the business. If one is favored over the other to any degree for any period of time, the enterprise



3 MEN—30 MOVES

All this motion to stack 10 boxes? Yes—every time you use hand methods! Here the camera follows the action by means of light bulbs placed on the 3 men's wrists.



1 MAN—1 MOVE

SAME JOB...

Straight up! That's the way these same boxes travel on a Barrett Portable Elevator. Not one at a time, but all at once—with no effort at all!

...but what a difference in cost! The difference between 3 men for several minutes and 1 man for a few seconds.

And this is just a *small* job—the mere storing of 10 boxes! Many plants perform such operations hundreds of times every day. Hundreds of times they repeat the *waste* in the picture on the left . . . or hundreds of times they repeat the *savings* made possible with Barrett Portable Elevators!

FLOOR SPACE COUNTS, TOO!

What about materials too heavy for hand stacking . . . materials often stored at floor level? Here again Barrett Portable Elevators save . . . by putting that wasted *air space* to work, clearing *floor space* for extra production. They save on heat and light, save on maintenance—perhaps even save the cost of a new building!

Whether your problem concerns space, labor, or both, call on a Barrett engineer. Without cost or obligation, he'll show you how Barrett Portable Elevators are built to your specific requirements.

What's the best way to handle it? Write for the book with the answers, your free copy of the Barrett Junior Catalog.

BARRETT-CRAVENS COMPANY
3261 West 30th Street • Chicago 23, Illinois

Representatives in All Principal Cities
Canadian Licensee: S. A. Armstrong, Ltd. • Toronto, Canada

BARRETT

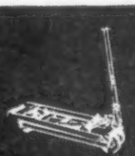
ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

Barrett Handling Equipment

PORTABLE ELEVATORS

STEEL STORAGE RACKS

ELECTRIC LIFT-TRUCKS


HAND LIFT-TRUCKS

SKIDS

BARREL TRUCKS

is certain to suffer to the detriment of of both groups.

2. Policies governing the work of the participants must be clearly stated before any work is done. Careful thought should be given to these policies to make them as complete and comprehensive as possible. At the same time care must be taken to avoid commitments that might not be kept.

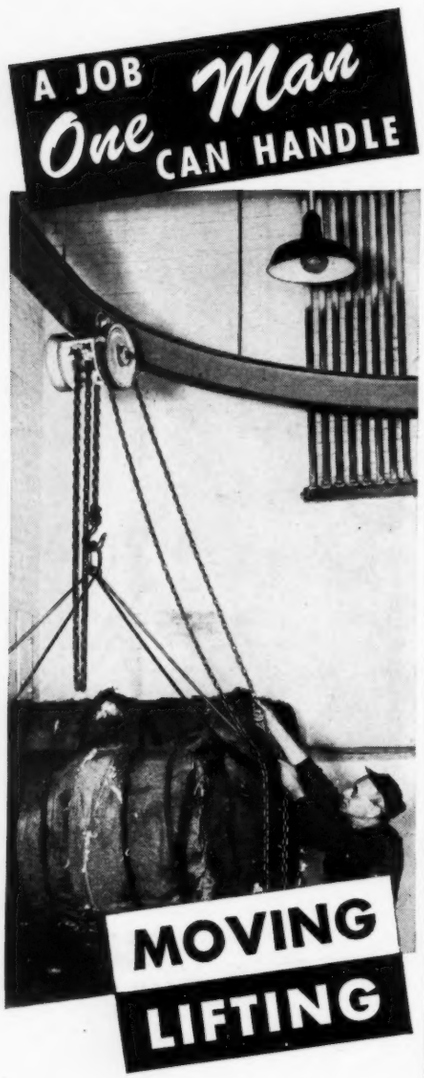
3. A standard must be based only upon facts and changed only by facts. Work standards must be based upon facts determined by careful and complete analysis. They must represent the best judgment of the ablest technicians available. These individuals must not be subjected to pressures from any source that could be interpreted as attempts to influence their decisions in favor of one party or another.

4. The fundamental reason for making the study should be fully stated. The reasons for the study may include such facts as the company's poor earning record, the type of wage plan in use not being satisfactory, an effort to provide more stable work, and the like.

At this time the goals or objectives of the study are clearly defined and established. The program outlining the step-by-step progression toward these goals should be drawn up and agreed upon by all parties concerned.

Actual participation can vary all the way from a purely advisory and interested position to that of representatives of the employees working full time with the engineers in a effort to reach satisfactory and equitable solutions to the problems. The degree of participation would depend upon the employee's measure of interest in participating beyond a "being kept informed" point and also upon the degree of maturity and confidence reached in this relationship between management and labor. Management and labor must approach these problems in an intelligent manner. They must determine a sound basis to establish their spheres of interest. If this is not done then indeed the future is dark.

Both management and labor must recognize that wage incentives are and can continue to be a valuable tool of management in its efforts to reward its employees properly and fairly and to control its costs. As such a tool, incentives will play an important part in our peace-time economy. It is, therefore, essential that both management and labor consider the proper development of wage incentive plans and their use so that each party will receive the maximum benefit from that use. It is up to management to point the way.



For moving bales, boxes, crates, drums, barrels with limited manpower, the Reading Multiple Gear Chain Hoist provides a practical solution.

Loads up to 2 tons can be lifted by one man. The load brake holds positively till released. Where I beam trolleys are used, loads can be moved with ease by one man.

Long life is insured by the sealed-in-oil gear unit—an exclusive feature. The all steel construction from hook to hook gives high overload capacity — guaranteed 25% over rated capacity.

See your nearest Reading Hoist distributor for help on your materials handling problems or write direct.

READING CHAIN & BLOCK CORPORATION
2103 ADAMS ST., READING, PA.
CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

What Makes A Mailing Click?

● *Advertising men agree —the list is more than half the story.*

McGraw-Hill Mailing Lists, used by leading manufacturers and industrial service organizations, direct your advertising and sales promotional efforts to key purchasing power. They offer thorough horizontal and vertical coverage of major markets, including new personnel and plants. Selections may be made to fit your own special requirements.

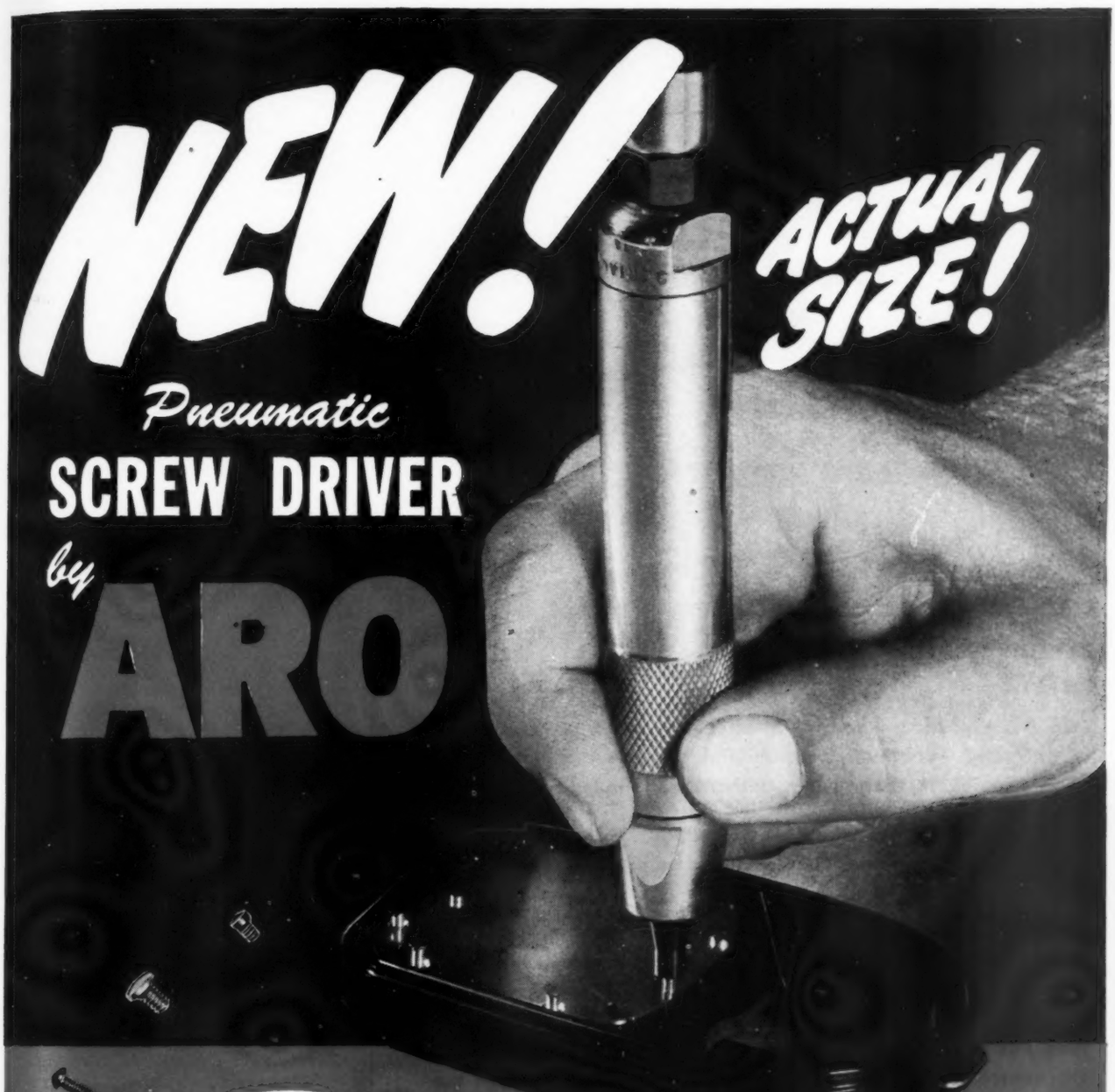
New names are added to every McGraw-Hill list daily. List revisions are made on a twenty-four hour basis. And all names are guaranteed accurate within two per cent.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want. Ask for more detailed information today. You'll probably be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

McGraw-Hill Publishing Co., Inc.
DIRECT MAIL DIVISION
330 WEST 42nd ST.
NEW YORK 18, N. Y.

NEW! ACTUAL SIZE!

Pneumatic
SCREW DRIVER
by
ARO

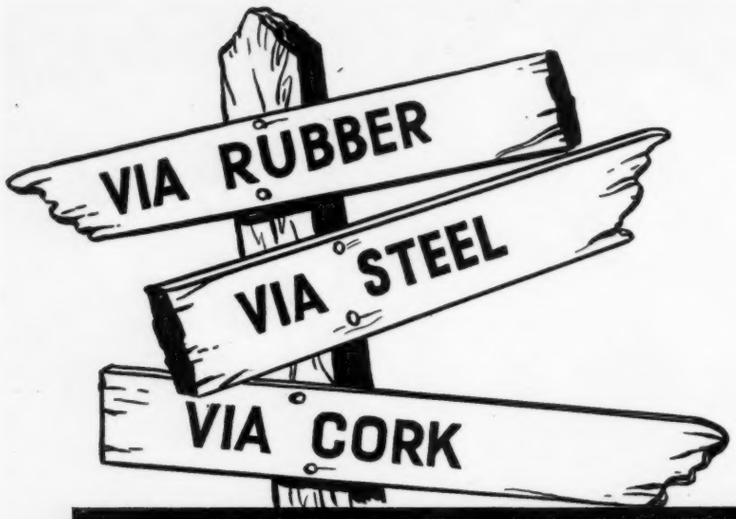


First and Only

POWER SCREW DRIVER SPECIFICALLY BUILT FOR SMALL SCREWS!

● Amazingly small in size—this new ARO Screw Driver is only the size and shape of the average cigar . . . weighs but 8 ounces . . . is 4⅞" long and ¾" in diameter. Simple to operate—drives screws from No. 1 to No. 6 . . . with fully automatic operation! Pneumatic powered. No manual throttle control . . . starts automatically when tool is applied to work. It adjusts itself to every driving condition.

Also available with adapter socket for nut setting. Simple construction for long life and fool-proof operation. Entire tool is chrome finished. Ideal to *speed up assembly* of radios, cameras, electrical appliances, electronic instruments and controls, and many other products having small screws and nuts. Write today for more information. The Aro Equipment Corporation, Bryan, Ohio.



THREE ROADS LEAD TO VIBRATION CONTROL and KORFUND utilizes All Three

***YOU CAN'T** operate impact machinery without vibration, and uncontrolled vibration causes building damage, machine breakdowns, accidents, spoiled work and lowered employee efficiency.*

***YOU CAN** control vibration . . .* Cork, Rubber, and Steel Spring vibration isolators have been designed to do the job.

But the question is *which* one for *your* requirements?

And that is the question Korfund Vibration Control Engineers can answer. We do not believe that any *one* isolating material is a cure-all for vibration and noise. For over forty years Korfund has specified installation of *all three types*. Selection of the control best suited for your machinery depends upon the nature of the installation, type of equipment isolated, and your local operating conditions.

Ask for a Korfund Vibration Control Engineer to recommend the proper isolators for your equipment, *now*, during your reconversion period. We have representatives in principal cities. And in the meantime write for more information.

KORFUND
VIBRATION CONTROL

THE KORFUND COMPANY, Inc., 4825 32nd ST., LONG ISLAND CITY 1, NEW YORK

BOOKS

LABOR POLICY OF THE FEDERAL GOVERNMENT

Harold W. Metz. The Brookings Institution, Washington, D. C. 284 pages. Index. $2.50.

Presents an analysis of the labor policy of the federal government, seeking to discover the attitude of the government toward the formation of unions, strikes, picketing, collective bargaining, union organization, the labor market, wages, hours, and the peaceful settlement of disputes. Ten chapters, including: "The Development of National Labor Policy"; "The Government and Concerted Action of Employees"; "Collective Bargaining and the Collective Agreement"; "The Government's Policy Toward Union Organization"; "The Government and the Labor Market"; "Conditions of Employment—Union Preference—Wages—Hours, Child Labor, and Safety"; "The Settlement of Labor Disputes"; "Machinery for the Adjustment of Wartime Labor Disputes."

LESSONS IN ARC WELDING

The Lincoln Electric Co., Cleveland, 176 pages. Photographs, drawings. 50c in the United States, 75c elsewhere.

Seventh printing of second edition. Includes 61 lessons in arc welding, with answers in the back of the book. Explains the fundamentals of welding and includes information on how to apply the latest types of electrodes and welding techniques developed during the war years.

ELEMENTARY ENGINEERING ELECTRONICS

Andrew W. Kramer, Managing Editor, *Power Plant Engineering*. Instruments Publishing Co., 1117 Wolfendale St., Pittsburgh. 340 pages. Drawings, figures, index. $2.

A book on electronics for readers in industry and technical schools who want to acquire a working knowledge of electron tubes and circuits without becoming radio engineers. Explains how the various types of electron tubes work and how they may be made to serve useful purposes. Thirty-four chapters.

TOMORROW'S TRADE

Stuart Chase. The Twentieth Century Fund, 330 West 42nd Street, New York 18. 150 pages. $1.

Subtitled "Problems of Our Foreign Commerce." No. 5 in series of six reports, known as "Guidelines to America's Future." Reviews the history of past international commerce, and outlines prospects for increasing foreign trade in the years of post-war reconstruction that lie ahead. Twelve chapters, including "Long Perspective"; "Stuff for Stuff: The Elemental Equation"; "Journey Through Utopia: The Century of Free Trade"; "Gold: The Journey Continued"; "The Twenties"; "The Thirties"; "Total War"; "Transition"; "Prospects for a World State"; "The Big Three: The United States, Russia, and Britain"; "New Roads"; "On the Home Front."

THE EFFICIENT USE OF FUEL

Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y. 807 pages. Drawings, tables, figures, index. $8.50.

A textbook on fuels and their efficient utilization for students and technical men in industry,

BOSTON WOVEN HOSE & RUBBER COMPANY

Lugging coal—you've done it, perhaps, in a small way. In a big way, it's a back-breaking job. But not for this conveyor belt of ours, in a Pennsylvania coal mine; despite reverse bending, a right-angle feed, large and unequal pieces to be carried, and an uneven distribution of load.

All these difficulties have meant nothing to it. It has been operating for many years, and plans to be for many more. BWH quality in materials, and our exclusive Rotocure process of vulcanization, are the answer.

Something rough and tough to carry? Ask our nearest distributor, or write to us. You'll be convinced.

BOSTON WOVEN HOSE & RUBBER COMPANY
WORKS: CAMBRIDGE, MASS.
POSTAL ADDRESS: BOX 1071
BOSTON 3, MASS., U.S.A.

KEEP THOSE BONDS

Made by the Rotocure process of continuous vulcanization which replaces variation with uniformity.

HERE'S THE TRAILER OF
A Thousand Uses!

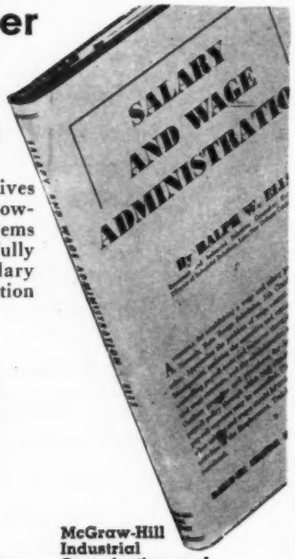
In every industry; wherever materials must be handled, you'll find No. 1002 making good! Many thousands are being used by the Armed Forces — thousands more in civil production. For a quality Trailer at a very low price, investigate this full swivel unit that's universal in use. Capacity: 4000 lbs.

Write today for Bulletin giving full details.

EWC TRAILERS

Electric Wheel Co., Dept. FA Quincy, Ill.

How to set up and administer a productive, acceptable salary and wage plan



In the simplest and clearest sort of treatment, this book gives executives a new view of salary and wage problems, showing the real root of many personnel and pay roll problems in faulty salary and wage policies, and concisely but fully describing the methods by which a basically sound salary and wage structure may be created and its administration and control effectively carried out.

Just Published

SALARY AND WAGE ADMINISTRATION

By RALPH W. ELLS

Economics and Industrial Relations Counselor

120 pages, 5⅝x8¾, $1.50

What effect do salary and wage plans have on absenteeism and turnover?
Why do some companies pay less than they should in times of prosperity and more than they need in times of depression?
How can business anticipate the effects of a guaranteed annual wage policy on its salary and wage program?
Why are Job Normals so important and how are they applied?
What are the advantages of establishing Rate Ranges rather than Single Fixed Rates?
How can properly interrelated merit, seniority, and incentive schedules be set up?

These are just a few of the questions answered in this book. The author's methods are built around the study of job normals, rate range schedules, job classifications, and job evaluation as the four essential foundation stones of a sound salary and wage structure. How to deal with each is plainly described, and illustrated with specific tables and examples.

McGraw-Hill Industrial Organization and Management Series

McGRAW-HILL EXAMINATION COUPON

McGraw-Hill Book Co., 330 W. 42 St., N.Y.C. 18

Send me Ells' **SALARY AND WAGE ADMINISTRATION** for 10 days' examination on approval. In 10 days I will send $1.50, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....

Address .....

City and State .....

Company .....

Position .....Fac. 1-46

In Canada: Mail to Embassy Book Co., 12 Richmond St. E, Toronto, 1

prepared under the direction of the Education Subcommittee of the Ministry of Fuel and Power, with a foreword to the American edition by John C. Olsen, Ph.D., The Polytechnic Institute of Brooklyn. Embraces the use of all fuels for industrial purposes, the composition and properties of all types of fuel, and the theories and principles of combustion.

BOOKLETS

THE GROWTH OF PERSONNEL MANAGEMENT in Great Britain During the War, 1939-1944. G. R. Moxon, Director of Personnel Advisory Services, Institute of Labour Management. Institute of Labour Management, Aldwych House, London, W. C. 2. 32 pages. 1 shilling.

WORKING CONDITIONS and Employee Services. B. J. Cohen and M. M. Towy-Evans. Institute of Labour Management, Aldwych House, London, W. C. 2. 87 pages, including appendixes. 2 shillings.

GOVERNMENT MEDIATION and Arbitration of Labor Disputes. Selected References No. 6. Industrial Relations Section, Princeton University, Princeton, N. J. 4 pages. 10c.

LABOR SAVINGS in American Industry. Solomon Fabricant. Occasional Paper 23. National Bureau of Economic Research, 1819 Broadway, New York 23. 52 pages, including appendix tables. Charts, tables. 50c.

WILL NEGROES GET JOBS NOW? Herbert R. Northrup. Public Affairs Pamphlet No. 110. Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York 30. 32 pages. Cartoons, charts. 10c.

GYPS AND SWINDLES. William Trufant Foster. Public Affairs Pamphlet No. 109. Public Affairs Committee, Inc., 30 Rockefeller Plaza, New York 20. 31 pages. Cartoons. 10c.

CODE OF MINIMUM REQUIREMENTS for Instruction of Welding Operators. Part A, Arc Welding of Steel $\frac{3}{16}$ to $\frac{3}{4}$ Inch Thick. American Welding Society, 33 West 39th St., New York 18. 83 pages. Photographs, drawings, tables. 50c.

WAGES DURING THE TRANSITION PERIOD. Jules Backman and M. R. Gainsbrugh. Studies in Business Economics No. 1. National Industrial Conference Board, 247 Park Ave., New York 17. 76 pages. Tables, charts. Single copy, 25c; less when ordered in quantities.

THE ADJUSTMENT OF THE NERVOUS VETERAN IN INDUSTRY. Meyer Brown, M.C., Ph.D. Industrial Welfare Department, Zurich Insurance Cos., 135 South LaSalle St., Chicago 3. 52 pages. Photographs. 10c.

ON THE CALENDAR

JANUARY

7–11, Society of Automotive Engineers, Inc., Annual Meeting and Engineering Display,

Advanced paper work methods for business

Available now—free booklets describing the Mimeograph single-writing method of handling these two major functions: Purchasing, Receiving and Inspection—and Complete Production Control.

Here's help in lining up your paper work problems on a sound and simple basis—with Mimeograph* duplication. Now, when you're in the midst of reconversion, is a good time to see what these advanced paper work systems can offer you.

The methods for handling purchasing, receiving and inspection, and for complete production control, are each set down step by step in booklets that are available at once.

Purchase order, receiving and inspection forms, for example, are all produced from a single writing, and in sufficient quantity to go to everyone concerned. The result is speedier, simplified paper work, and surer control up and down the line.

Send coupon for either or both of the booklets. They'll tell you the complete story of why both large and small businesses have found these systems real time and money savers.

A. B. Dick Company

Mimeograph duplicator

*MIMEOGRAPH is the trade-mark of A. B. Dick Company, Chicago, registered in the U. S. Patent Office.

A. B. Dick Company, Dept. L-146, 720 W. Jackson Blvd., Chicago 6, Ill.

Please send me literature on the following:

☐ Purchasing, Receiving and Inspection ☐ Complete Production Control

NAME.....

COMPANY.....

ADDRESS.....

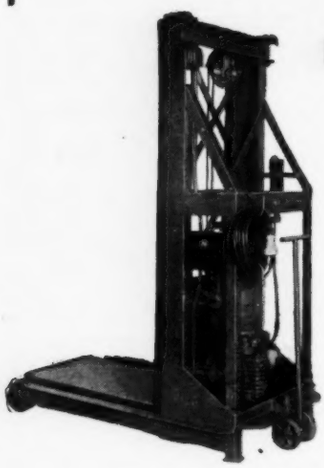
CITY.....STATE.....

COPYRIGHT, A. B. DICK COMPANY

MERCER

Material Handling Equipment

"THE NAME THAT CARRIES WEIGHT"



PORTABLE STACKING ELEVATORS

Telescopic Type

Trailer Trucks, Platform Elevators, Conveyors, Wheel Tractor Cranes . . . Material Handling Equipment of every type. Designed to your requirements by experienced engineers whose reputation is founded upon doing things right. Literature available. Inquiries invited.

MERCER ENGINEERING WORKS, Inc.

WORKS: CLIFTON (ALLWOOD) N. J.

Sole Representatives
MERCER-ROBINSON CO., Inc.
30 CHURCH ST.
NEW YORK 7, N. Y.

- CUTS ALL METALS—WOOD—PLASTICS
- SAWS AND FILES IN INACCESSIBLE PLACES
- OPERATES BY ELECTRICITY—FLEXIBLE SHAFT—AIR
- SIMPLE AND EASY TO USE—LIBERALLY GUARANTEED

SEE YOUR JOBBER OR WRITE DIRECT

Mid-States EQUIPMENT CO.

Saw-Gun Division

2421 SOUTH MICHIGAN AVENUE, CHICAGO 16, ILLINOIS

Book-Cadillac Hotel, Detroit. John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18.

21–25, American Institute of Electrical Engineers, Winter Technical Meeting, Engineering Societies Building, New York. H. H. Henline, Secretary, 33 West 39th St., New York 18.

•

28–30, American Society of Heating and Ventilating Engineers, 52nd Annual Meeting, Hotel Commodore, New York. R. H. Carpenter, Chairman, 51 Madison Ave., New York 10.

28–Feb. 1, National Recreation Association, 28th National Recreation Congress, Claridge Hotel, Atlantic City, New Jersey. Thomas E. Rivers, Secretary, 315 Fourth Ave., New York.

FEBRUARY

4–8, American Society for Metals, 27th National Metal Exposition, Cleveland Public Auditorium, Cleveland. W. H. Eisenman, Secretary and Managing Director, 7301 Euclid Ave., Cleveland 3.

13–15, American Management Association, Personnel Conference, Palmer House, Chicago. James O. Rice, Assistant Secretary and Editor, 330 West 42nd St., New York 18.

20–22, American Institute of Mining Engineers and American Society of Mechanical Engineers, Joint Fuels Conference, Hotel Pennsylvania, New York. Harry Maloney, Assistant Treasurer, 29 West 39th St., New York.

25–Mar. 1, American Society for Testing Materials, Spring Meeting, Hotel William Penn, Pittsburgh. Robert J. Painter, Assistant to Secretary, 260 South Broad St., Philadelphia.

25–Mar. 2, Twentieth Exposition of Chemical Industries, Grand Central Palace, New York. Charles F. Roth, Manager, 480 Lexington Ave., New York.

•

Factory Management and Maintenance is a consolidation of *Factory and Industrial Management* and *Maintenance Engineering*.

Factory and Industrial Management grew from consolidations, mergers, or absorptions involving the following publications: *The Engineering Magazine; Industrial Management; Factory, the Mazagine of Management; Management Engineering; Administration; Management and Administration; Management and Administration in Manufacturing Industries; Manufacturing Industries.*

Maintenance Engineering grew from consolidations, mergers, or absorptions involving the following publications: *Review of the Telephone and Telegraph; Electrical Review; Western Electrician; Electrocraft; Electrical Engineering; Electrical Review and Industrial Engineer; Industrial Engineer; Industrial Engineering; Industry Illustrated.*

In addition, features of the publication *Timely Ideas* have been added.

All rights in the above names are reserved by the publisher.